

BMS302(Physiology lab):
Practical vision and hearing



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F A C U L T Y O F
M E D I C I N E

F A L L 2 0 2 5

By the end of this lab, you should be able to:

- Examine the visual field <
- ② Investigate the Light reflex, and predict the effects of visual pathway lesions
- ② Examine the Near response
 - Assess the visual acuity <
 - Simulate fundus examination < *device name*
 - Test for colour vision < *test name + lesions*
 - Differentiate between Qualitative and quantitative hearing tests

Visual field

(one fixed eye)

Definition: the part of the external world seen by the fixed eye.

Divisions:

- 1) **Nasal half: medial to the fixation point.**
- 2) **Temporal half: lateral to the fixation point.**

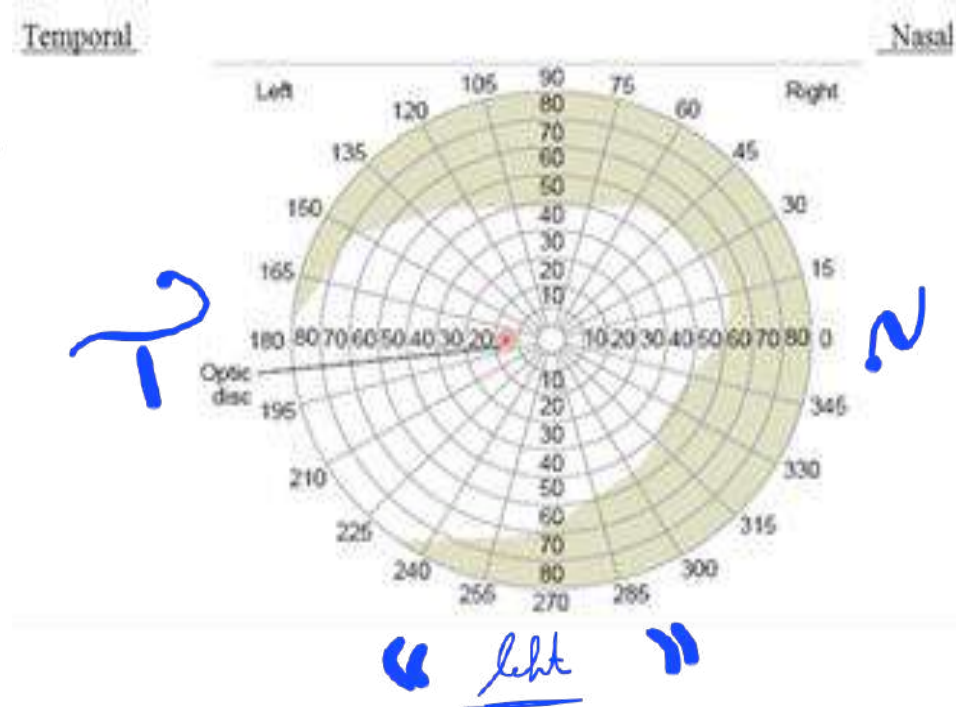
Each of these 2 halves is divided into upper & lower quadrants.

Dimensions:

Normal visual field is not circular

- up 50° (limited by the eye brow).
- down 70° (limited by the checks).
- nasally 60° (limited by the nose).
- temporally 90° - 100° (not limited).

100°



Projection of field of vision on the retina:

Temporal half of the field → Nasal half of the retina.

Nasal half of the field → Temporal half of the retina.

Measurement of visual field:

1. Confrontation method

2. The perimetry method

Significance of Measurement of field of vision:

For diagnosis & localization of:

1- Generalized field contraction (progressive optic atrophy)

2- Scotoma : localized area of blindness .

3- Neurological field defects due to lesion in the visual pathway from the optic nerve to the visual cortex.

I- Confrontation test:

→ Screening of visual field defects



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Crude method

Doctor and patient
confronting 60cm away from
each other.

Each closes opposite eyes.

They fix their eyes.

→ Visual field → اربع
→

Use white object why? ① Easily detected and not affected by color vision defects

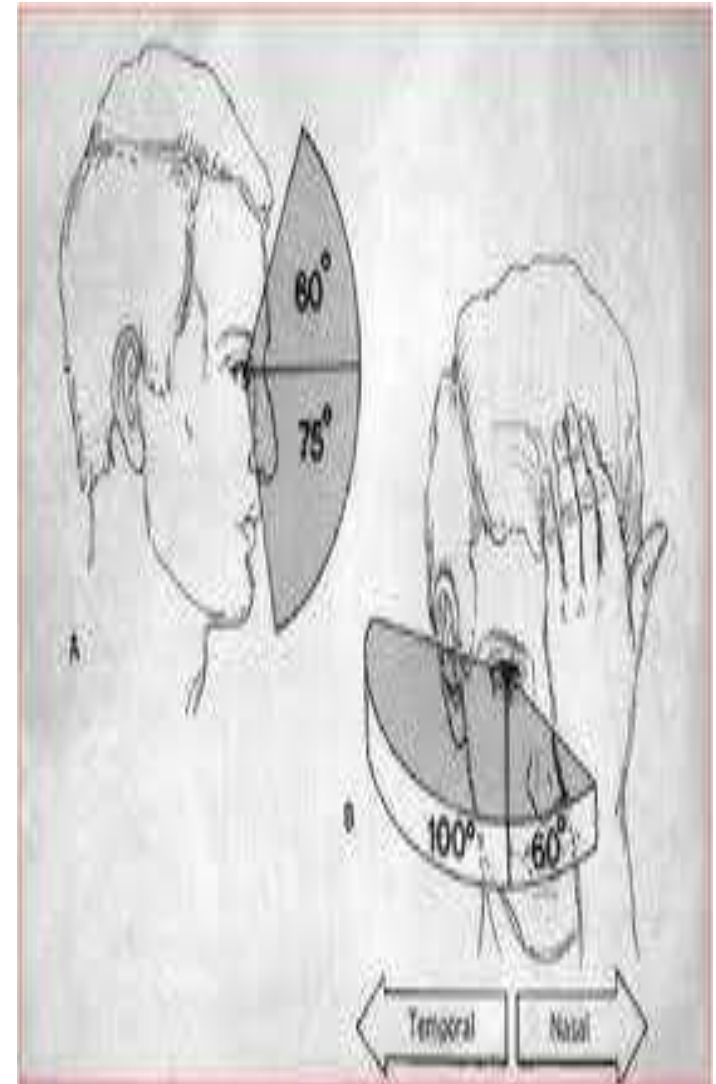
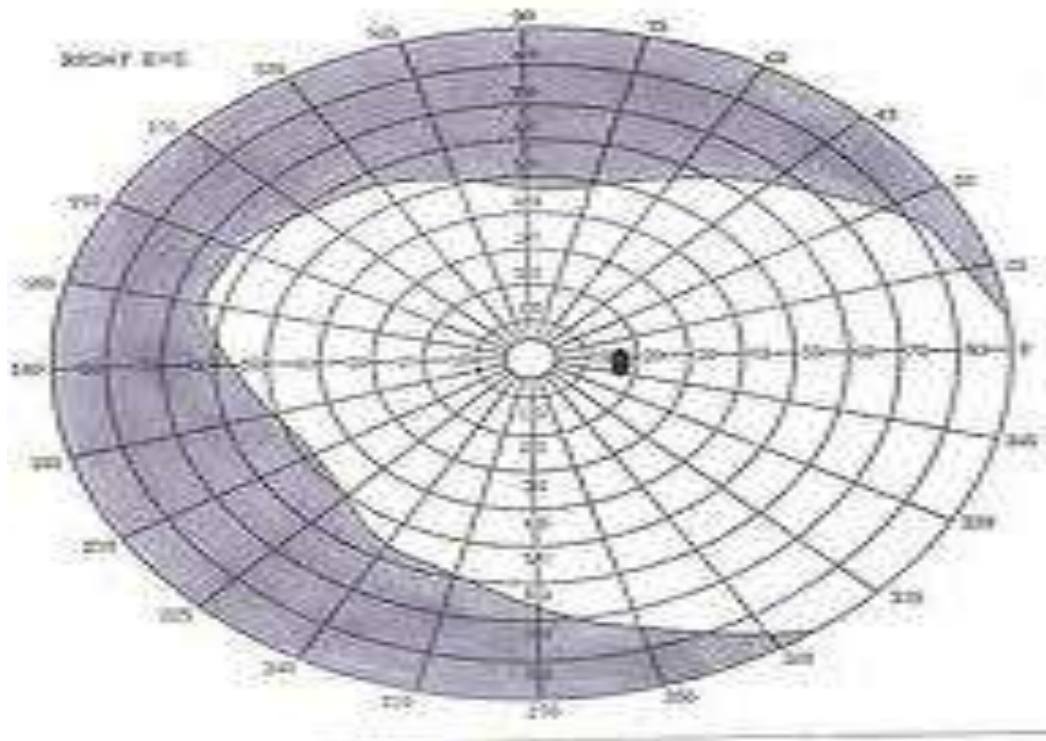
Glasses?

→ Should be removed because their frames block the peripheral field and produce false visual field defects



Dimensions of normal visual field:

Upwards:	50°
Downwards:	70°
Nasal:	60°
Temporal:	80°



Physiological Blind Spot

the optic disc is the point where the optic nerve leave the eye and where no photoreceptors present → so this area can not detect light

The optic disc, where the optic

nerve leaves the eye is 3mm

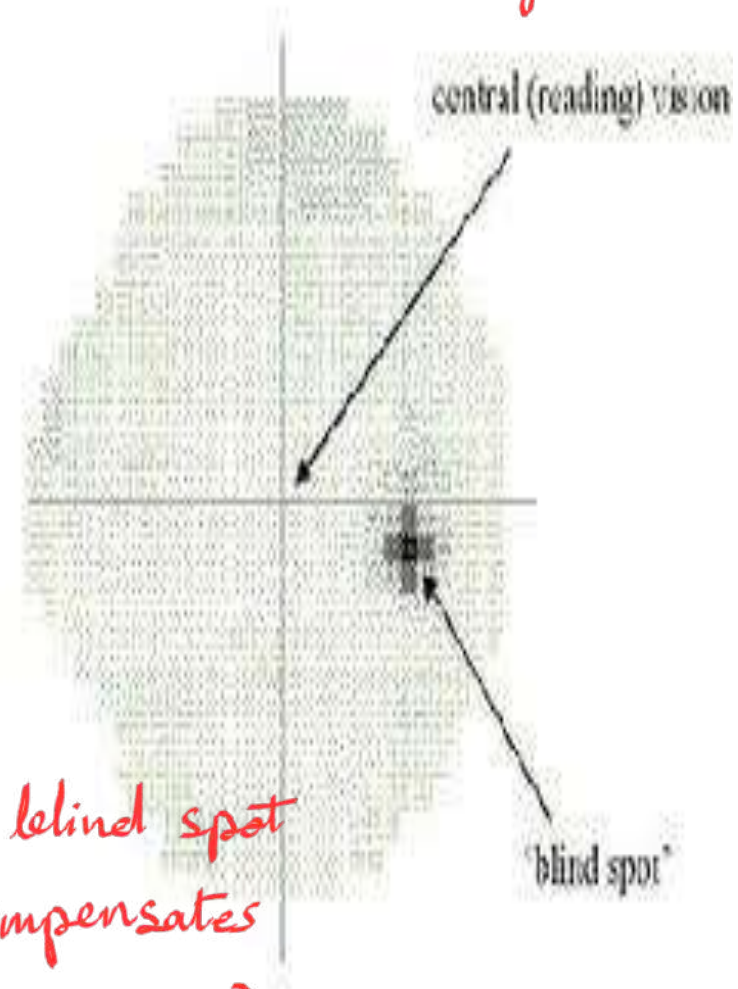
nasal to the fovea centralis.

❖ The blind spot is 15°

temporal to the center of the

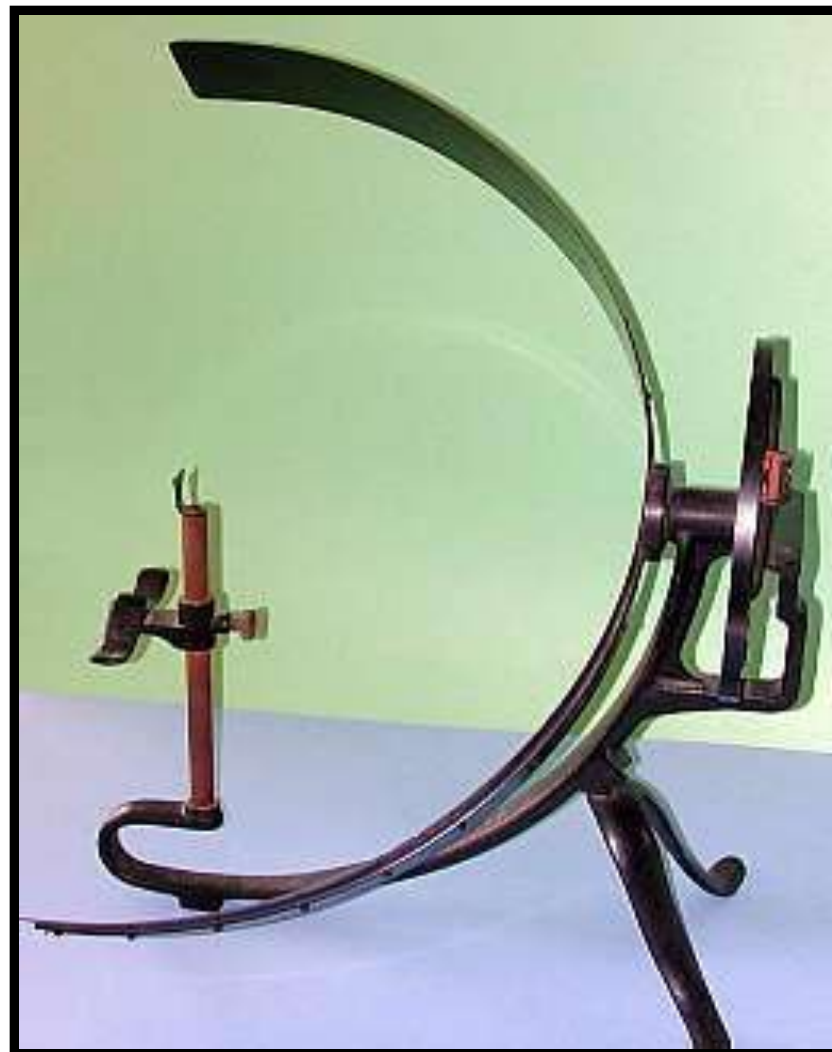
visual field.

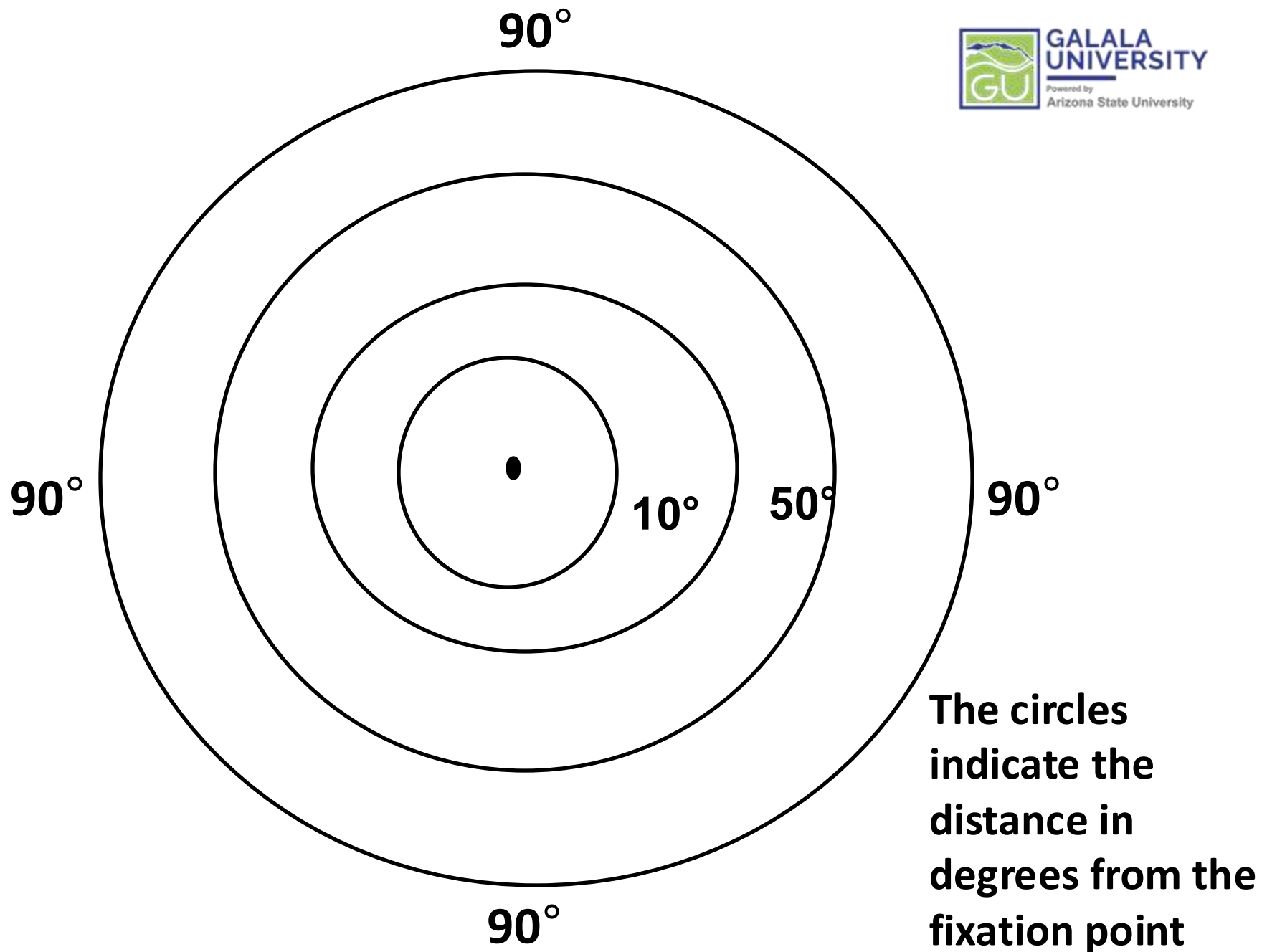
we don't notice the blind spot
→ because the other eye compensates
(Binocular vision)

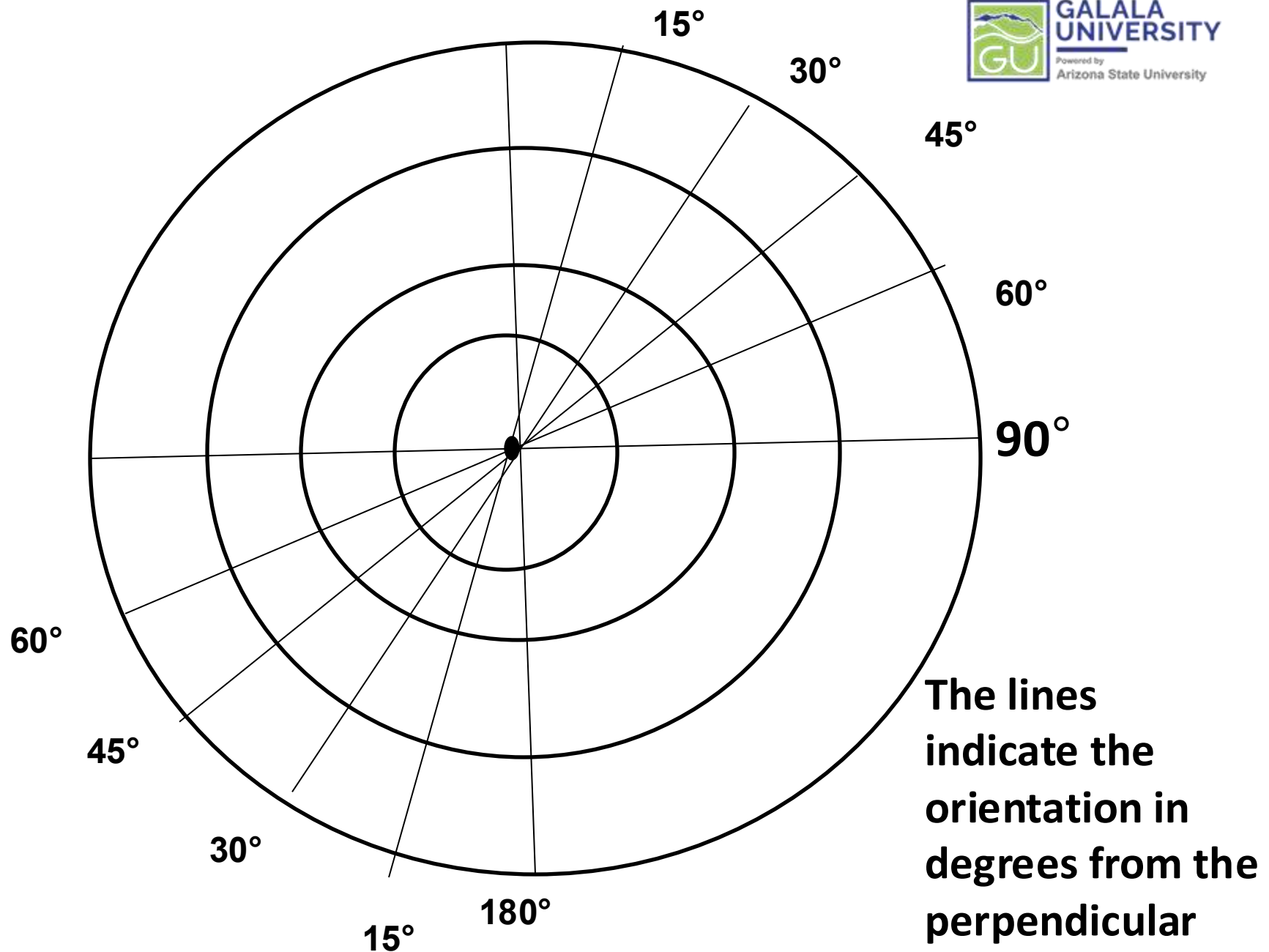


II- Perimetry

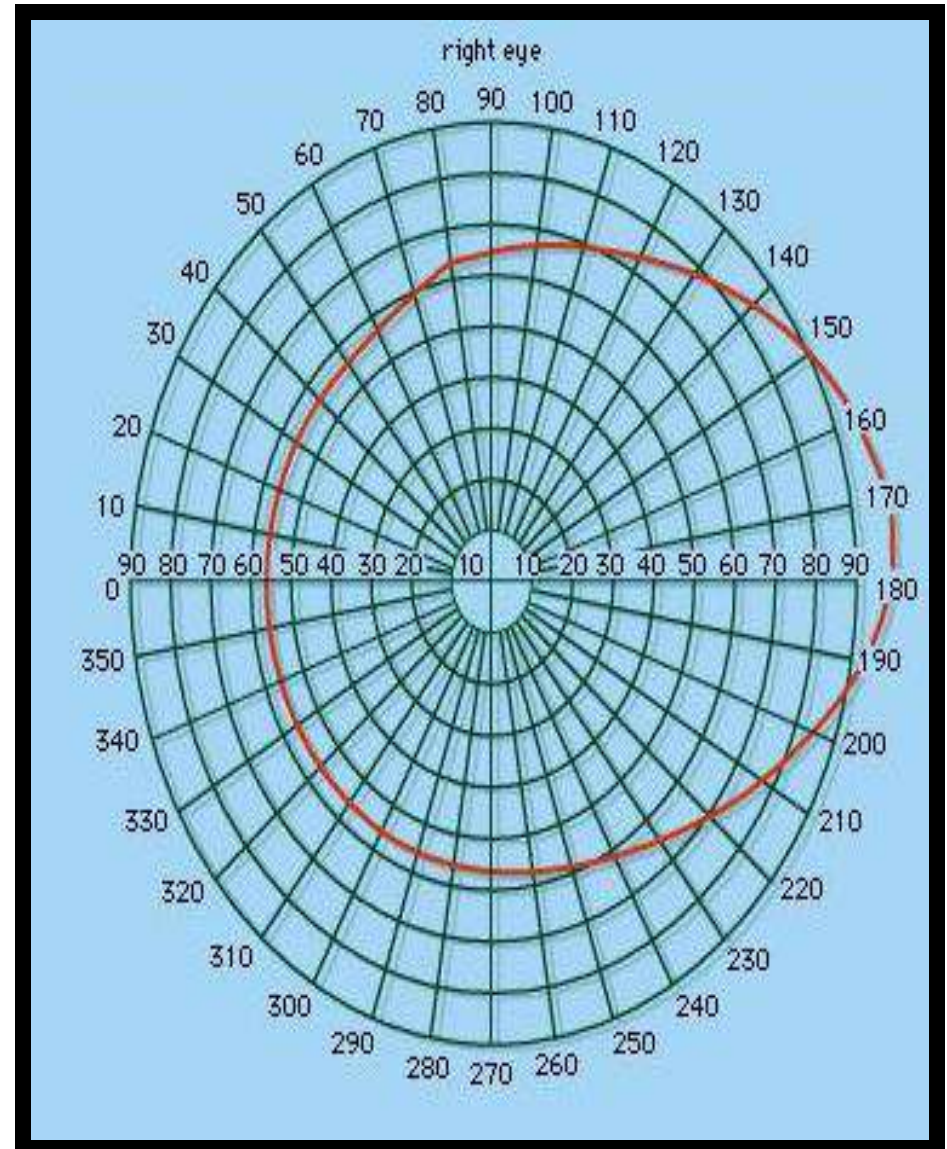
- To examine **right eye** ask the patient to hold it with his right hand
- Place it on his **right cheek** and stabilize his right eye on the mirror.
- His **left eye is closed**.
- The visual field is plotted on a perimetry chart.





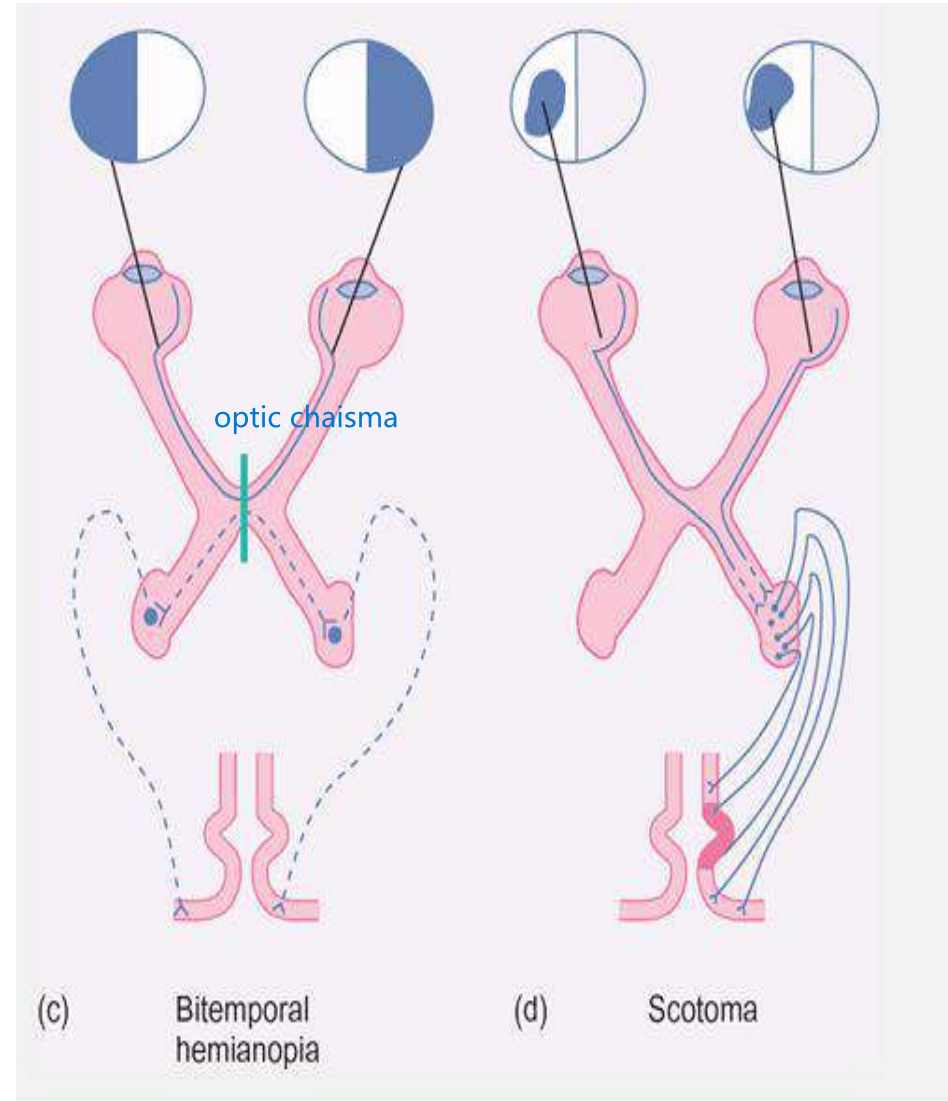
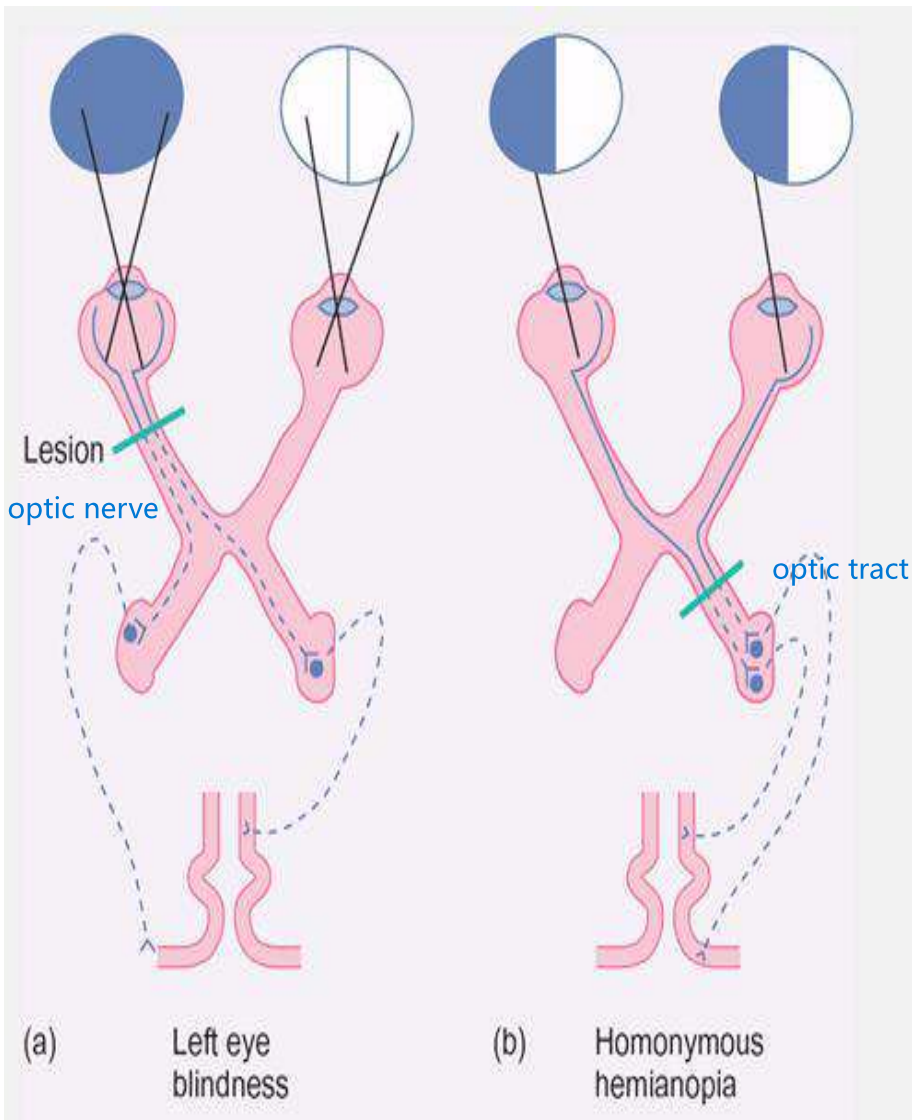


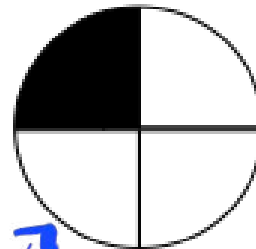
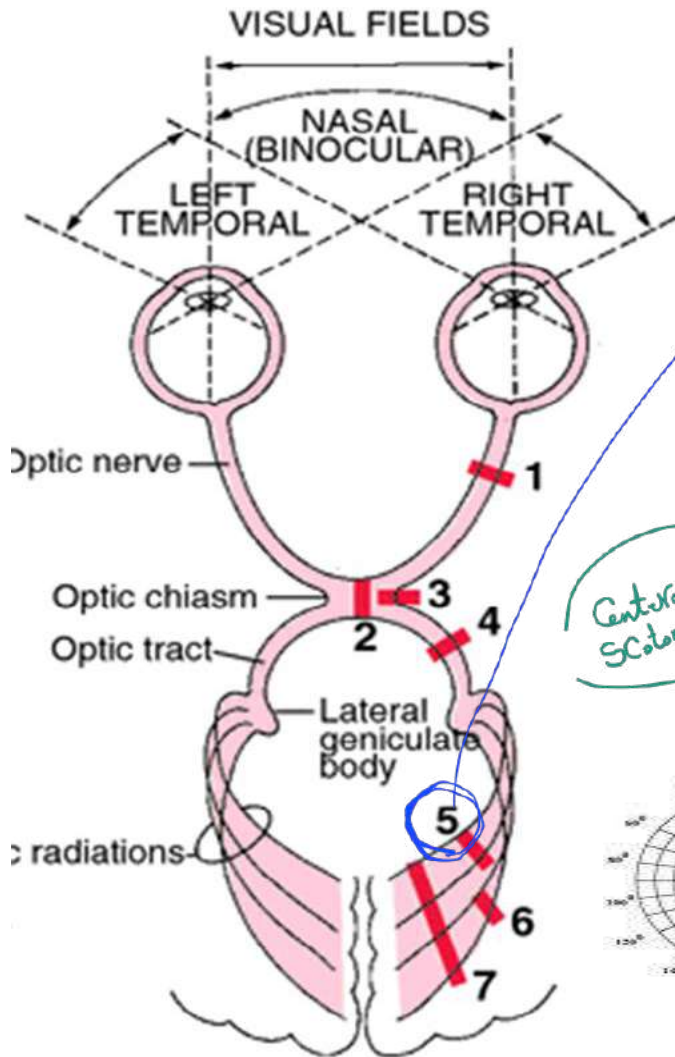
- Name.
- Bound.



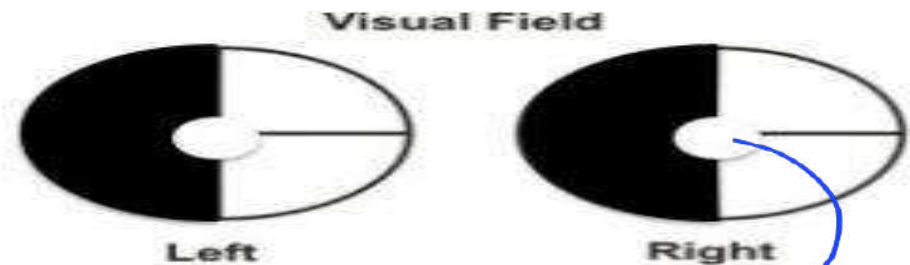
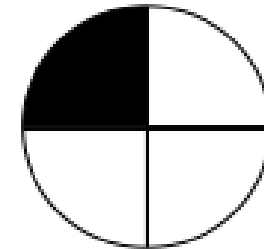
med Q

Visual field defects





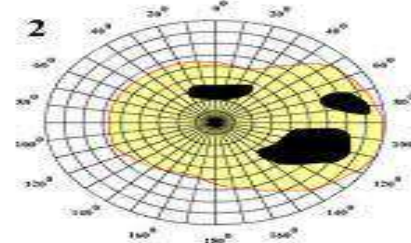
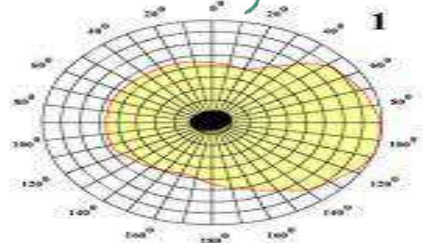
Left homonymous Superior quadrantanopia



Lesion in visual cortex

macula sparing

Central Scotoma



Scattered scotomas

Monocular visual loss

Ipsilateral retinal or optic nerve lesion
Retinal, e.g. central retinal artery/vein occlusion*, retinal detachment*
Optic nerve, e.g. optic neuritis*, optic atrophy, glaucoma*

Bitemporal hemianopia

Optic chiasm lesion
e.g. pituitary tumour, craniopharyngioma

Homonymous hemianopia

Contralateral optic tract (or whole optic radiation) lesion
e.g. middle cerebral artery occlusion (stem)*

Homonymous inferior quadrantanopia

Contralateral parietal (upper) optic radiation lesion
e.g. parietal tumour or middle cerebral artery occlusion (superior branch)*

Homonymous superior quadrantanopia

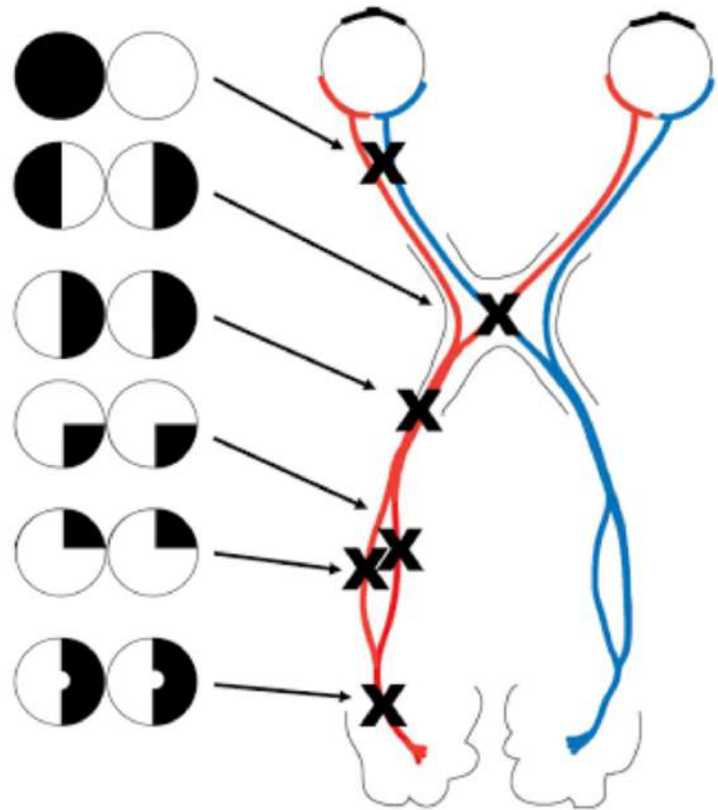
Contralateral temporal (lower) optic radiation lesion
e.g. temporal tumour or middle cerebral artery occlusion (inferior branch)*

Homonymous hemianopia with macular sparing

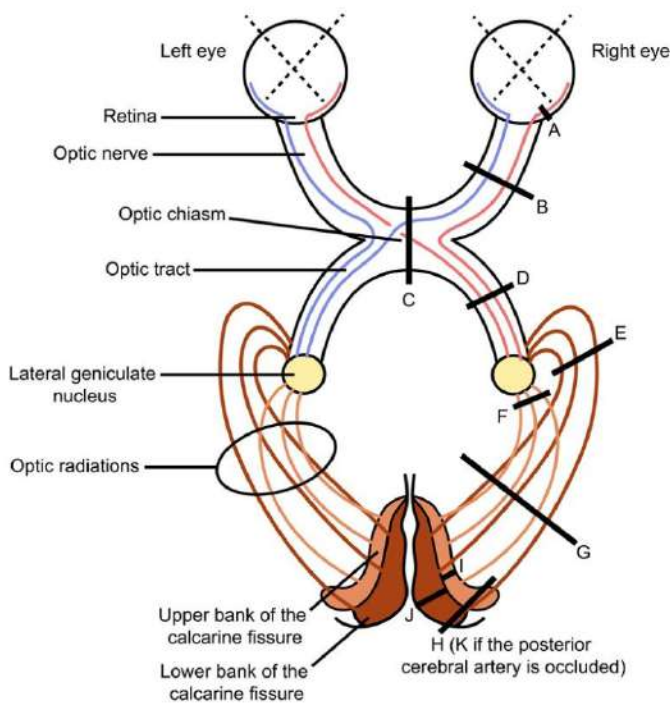
Contralateral occipital visual cortex lesion
e.g. posterior cerebral artery occlusion*

405
Parietal
Inferior
Temporal
Superior

* = acute causes

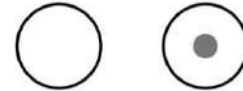


Visual Field Defects



Visual field deficit

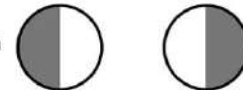
A) Central scotoma



B) Monocular vision loss



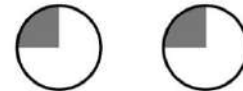
C) Bitemporal hemianopia



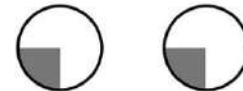
D, G, & H) Contralateral homonymous hemianopia



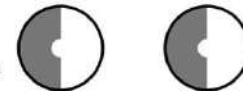
E & J) Contralateral superior quadrantanopia



F & I) Contralateral inferior quadrantanopia



K) Contralateral homonymous hemianopia with macular sparing



Vision

<i>Lesion</i>	<i>Vision</i>	<i>Light reflex</i>
<u><i>Optic nerve</i></u>	<u>Blindness in the affected eye.</u>	<u>Amaurotic pupil</u>
<u><i>-Central chiasma</i></u>	<u>-Bitemp. hemianopsia.</u>	<u>-Hemianopic</u>
<u><i>-Periph. chiasma</i></u>	<u>-Binasal hemianopsia.</u>	<u>-Hemianopic</u>
<u><i>-Ant. optic tract</i></u>	<u>Crossed homonymous hemianopsia</u>	-Hemianopic
<u><i>-Post. optic tract</i></u>		-Normal
<i>LGB</i> lateral geniculate body	Crossed homonymous hemianopsia	-Normal
<i>-Temp. radiations</i>	-Crossed hom. sup. Quadrantanopsia	-Normal
<i>-Pariet. radiations</i>	-Crossed hom. inf. quadrantanopsia	
<i>Visual cortex</i>	Crossed homonymous hemianopsia with <u>macular sparing.</u>	-Normal
<i>Tip of occipital lobe</i>	<u>Hemianopic scotoma</u> (bilat. Loss of central vision)	-Normal

Q: Mention Pupillary reactions to light?

1) **Amaurotic pupil**: (pupil of blind eye)

No response to direct light reflex.

Gives consensual light reflex.

2) **Hemianopic pupil**: (pupil of hemianopic eye)

No response to light reflex when light comes from the blind half of the field.

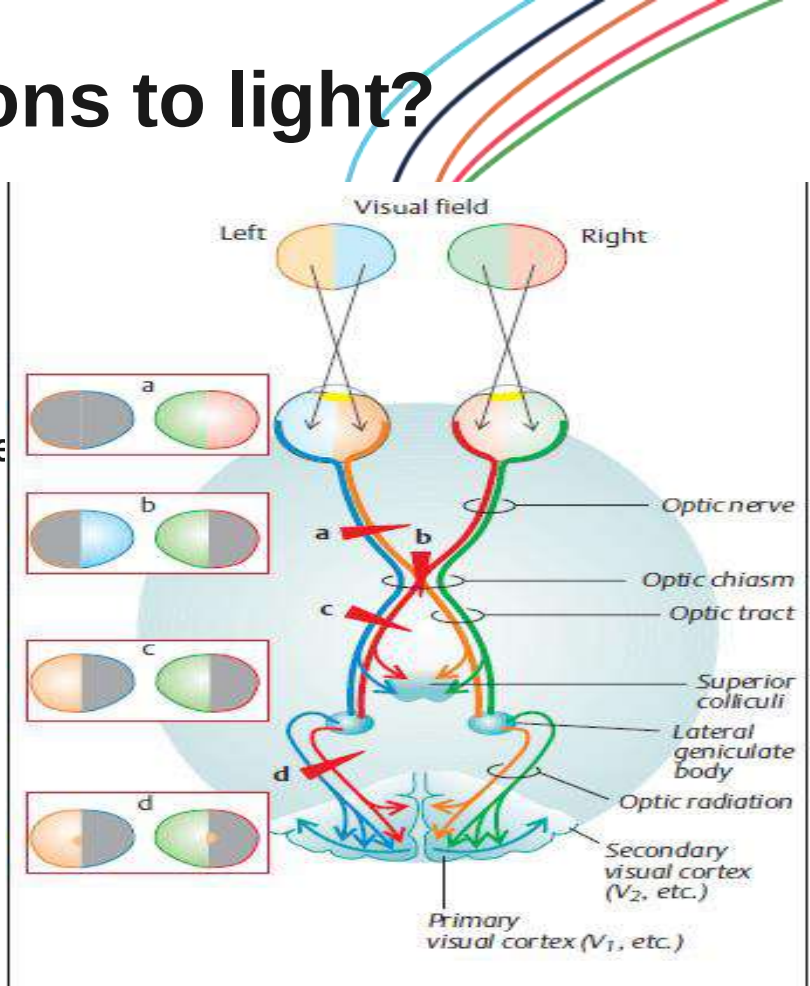
3) **Light-near dissociation** : (Argyll-Robertson pupil = lesion in pretectal area)

No response to light reflex.

Constricts normally in near response.

4) **Dilated fixed pupil**: (4th stage of anesthesia)

Medullary paralysis, No response to light reflex.



QUESTIONS

- Q.1 Define the field of vision? What is the extent of a normal field?
- Q.2 Which parts of the retina are tested by perimetry?
- Q.3 What is the physiological blind spot and what is its significance?
- Q.4 Describe the visual pathway?
- Q.5 What is bitemporal hemianopia and what is its cause?
- Q.6 What is binasal hemianopia and what is its cause?
- Q.7 What is homonymous hemianopia?
- Q.8 What is a scotoma?
- Q.9 Name any other method of determining the field of vision?

① Area of external world can be seen by single fixed eye.

• up $\rightarrow 50^\circ$ down $\rightarrow 70^\circ$ Nasal $\rightarrow 60^\circ$ Temp $\rightarrow 90^\circ$.

Field of Vision

② Nasal & temp. half of Retina. (peripheral pt.) **N.B** Central $\rightarrow$ visual acuity & Color vision

③ **Physiological Blind Spot**
the optic disc is the point where the optic nerve leave the eye and where no photoreceptors present $\rightarrow$ so this area can not detect light

Which corresponds to optic disc on retina

located at 15° temp. to Center of Visual Field.

Blind Spot

• Significant $\rightarrow$ the only point on retina insensitive to light

④ light activates Rods & Cones in Retina (photoreceptors)

$\downarrow$

Bipolar & ganglion Cells $\rightarrow$ optic nerve $\rightarrow$ optic chiasm $\rightarrow$ optic tract $\rightarrow$ LGN $\rightarrow$ optic Radiation $\rightarrow$ Visual Cortex

Visual Path.

⑤ $\rightarrow$ loss of vision in temporal (outer) half of visual field of both eyes.

Cause $\rightarrow$ lesion in optic chiasm. « Central »

Bitemp. hemi.

⑥ $\rightarrow$ in Nasal (inner)

Cause $\rightarrow$ " " " " « Periph »

Binasal hemi

⑦ loss of The same half of visual field in both eyes.

homonymous hemianopia

⑧ Scotoma $\rightarrow$ area of partial / complete blindness.

⑨ Method of determining The field of vision $\rightarrow$ Perimetry
 $\rightarrow$ Confrontation method

Center → pretectal nucleus
(midbrain)

Light Reflex

Temporal
X Near
Response

Receptor → Rods and cones

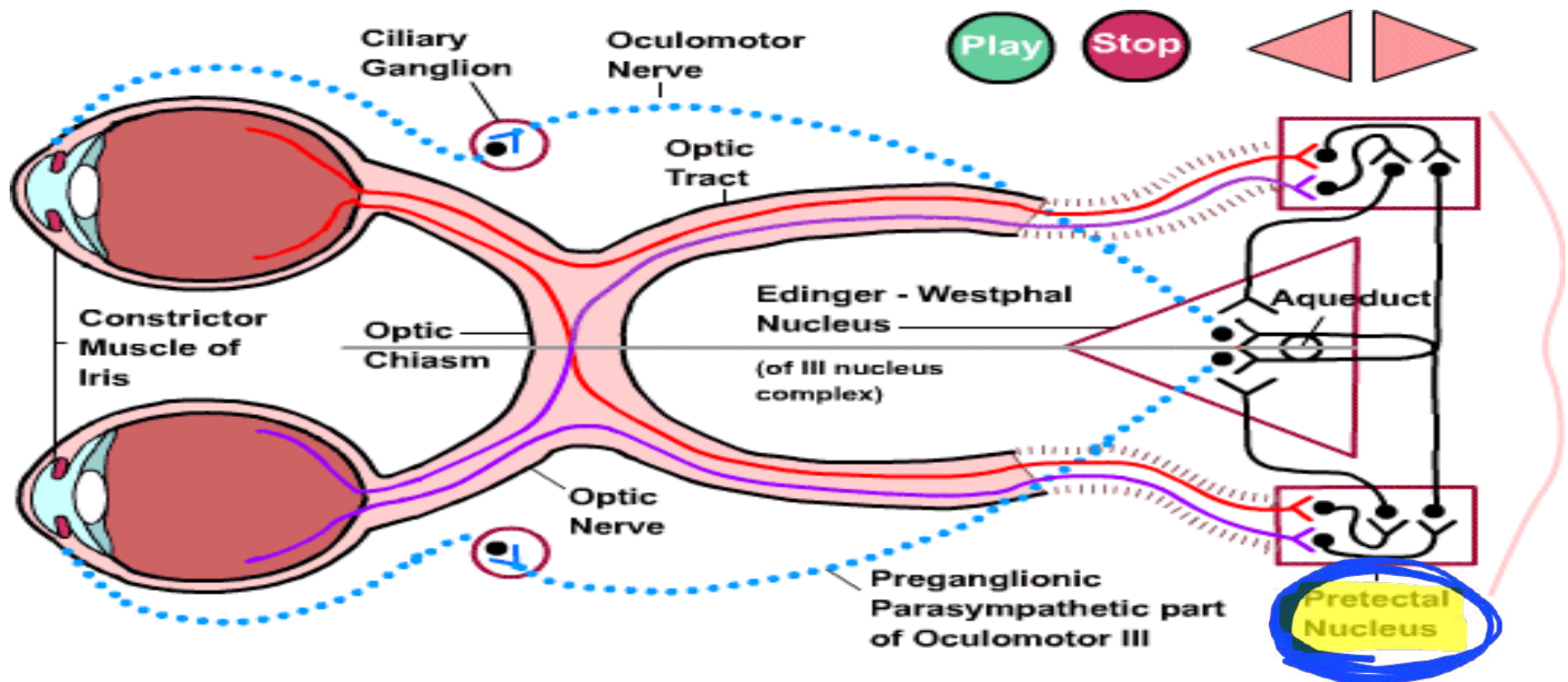
Stimulus: Applying light to the pupil

Afferent: Optic nerve ~ But no relay in LGB

Efferent : Oculomotor nerve ~ Parasympathetic part

Response: Direct and consensual pupilloconstriction

VIP

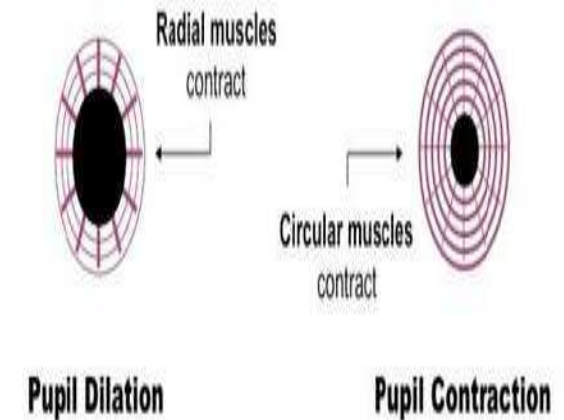
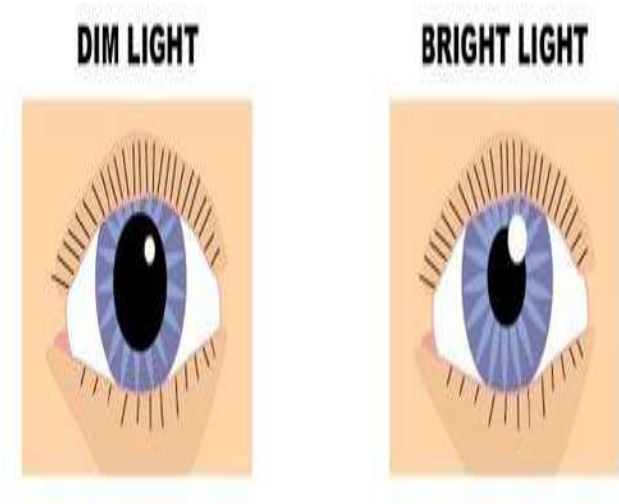


Procedure

- ❖ In a dark room ask the subject to focus on distant object and observe the size and symmetry of both pupils.
- ❖ Expose one eye to light from the lateral side after separation of both eyes by barrier on the nose and observe both pupils.
- ❖ The normal response is constriction of both pupils .
- ❖ Constriction of the exposed eye is called direct light reflex.
- ❖ Constriction of unexposed eye is called consensual light reflex .

Significance of pupillary light reflex

1. Regulation of amount of light entry (protective).
2. Diagnosis of nervous diseases and localization of lesion in visual pathway .



Pupillary light reflex



100%
Q

Lesions of light reflex

* Optic nerve damage (sensory component)

→ Ipsilateral direct reflex loss *→ when testing damaged eye*

Contralateral direct reflex intact *→ when testing normal eye*

* Oculomotor nerve damage (motor component) →

Damaged side both direct & consensual reflex loss

Opposite side both direct & consensual reflex intact

* Argyll Robertson pupil → Pupil

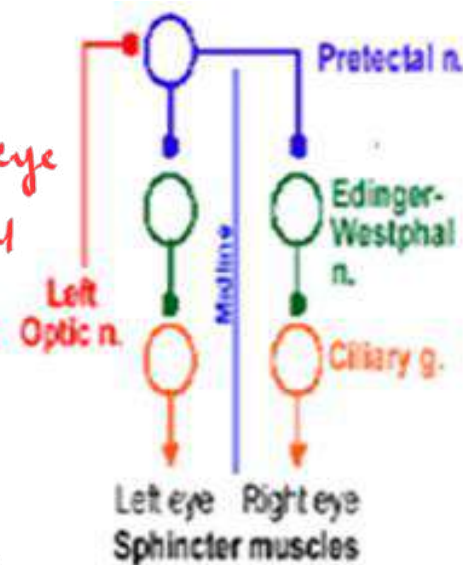
does not react to light, but will

react to near vision

(accommodation)

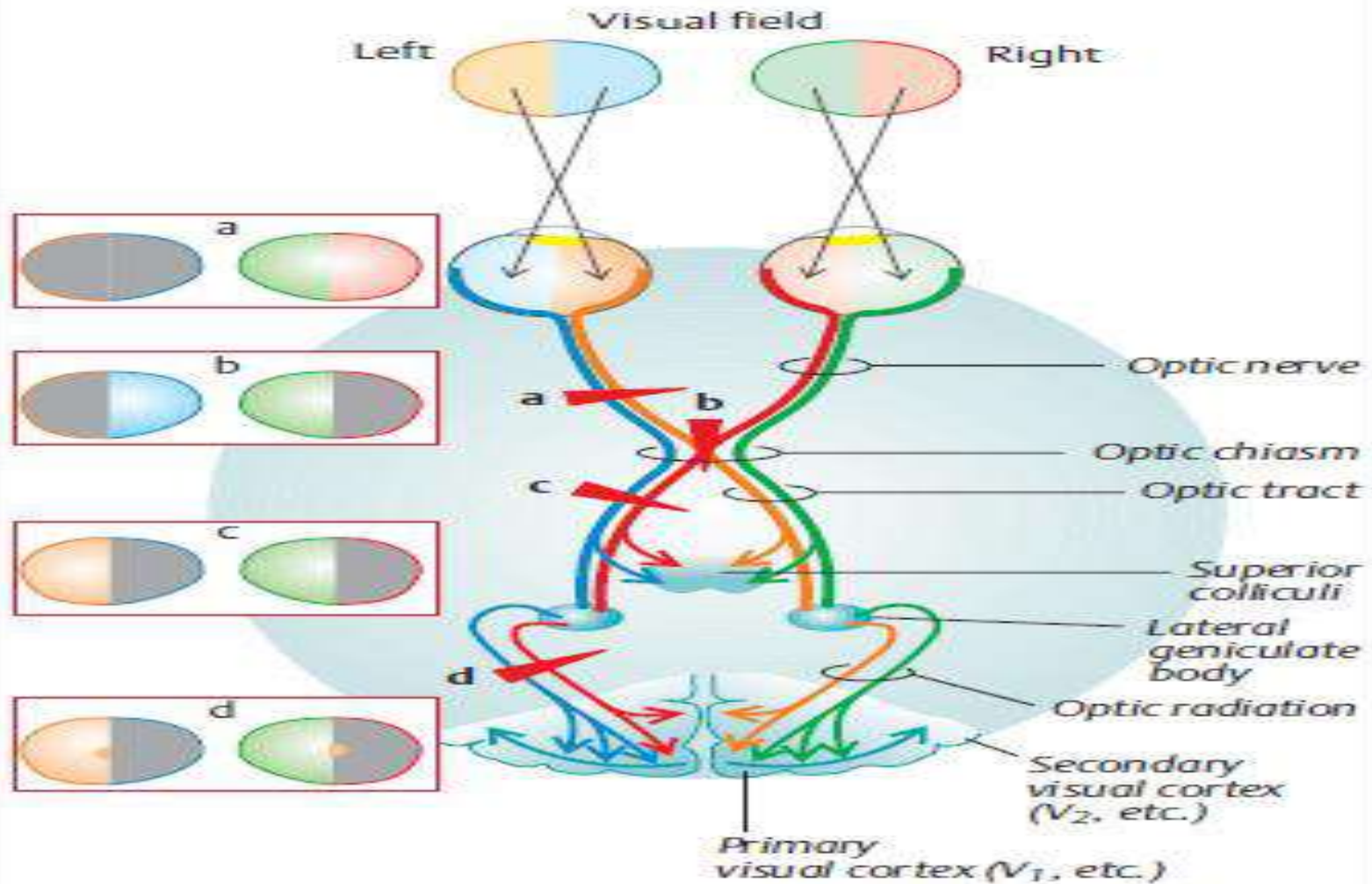
Caused by: Lesion in pretectal

area



light reflex → absent

Near reflex → present



1. Amaurotic pupil

Pupil does **not react to light** when light is shone in the **blind eye**, but reacts normally when the normal eye is illuminated.

2. Hemianopic

Loss of **half** of the visual field.

3. Bitemporal hemianopsia

Loss of **temporal (outer)** visual fields in **both eyes**.

4. Binasal hemianopsia

Loss of **nasal (inner)** visual fields in **both eyes**.

5. Crossed homonymous hemianopsia

Loss of the **same side half** of vision in both eyes (right field OR left field).

6. Crossed homonymous superior quadrantanopsia

Loss of the **upper quarter** of the visual field on the same side in both eyes ("pie in the sky").

7. Crossed homonymous inferior quadrantanopsia

Loss of the **lower quarter** of the visual field on the same side in both eyes ("pie on the floor").

8. Hemianopic scotoma

A **blind spot** affecting part of **one half** of the visual field (often central).

9. Macular sparing

The **central vision (macula)** is preserved despite having homonymous hemianopia.

Lesion	Vision	Light reflex
Optic nerve	Blindness in the affected eye.	Amaurotic pupil
-Central chiasma	-Bitemp. hemianopsia.	-Hemianopic
-Periph. chiasma	-Binasal hemianopsia.	-Hemianopic
-Ant. optic tract	Crossed homonymous hemianopsia <i>معي متجانس عكس الاتجاه</i>	-Hemianopic
-Post. optic tract	(Contralateral) Crossed homonymous hemianopsia	-Normal
LGB	Crossed homonymous hemianopsia	-Normal
-Temp. radiations	-Crossed hom. sup. Quadrantanopsia	-Normal
-Pariet. radiations	-Crossed hom. inf. quadrantanopsia	
Visual cortex	Crossed homonymous hemianopsia with macular sparing. <i>→ macula has dual blood supply</i>	-Normal
Tip of occipital lobe	Hemianopic scotoma (bilat. Loss of central vision)	-Normal

Note: Argyll Robertson pupil means Light Near response dissociation.

ARP= Accommodation reflex is present as the lesion is in pretectal area which is the center of light reflex.

The center of near response is superior colliculus

QUESTIONS

Q.1 Mention the pathway of light reflex?

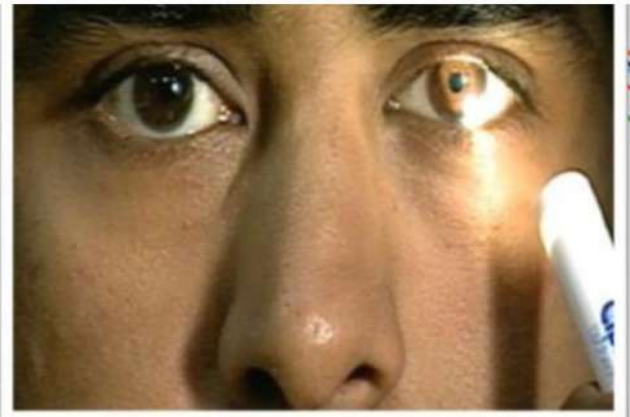
Q.2 What are the direct and consensual light responses?

Q.3 What is the cause of consensual light reflex?

2

• **Types:**

- 1) **Direct light reflex:** constriction of pupil of the **stimulated** (light exposed) eye.
- 2) **Consensual light reflex:** constriction of pupil of the **unstimulated** eye.



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1

Nervous pathway of light reflex

Stimulus: light applied to one eye.

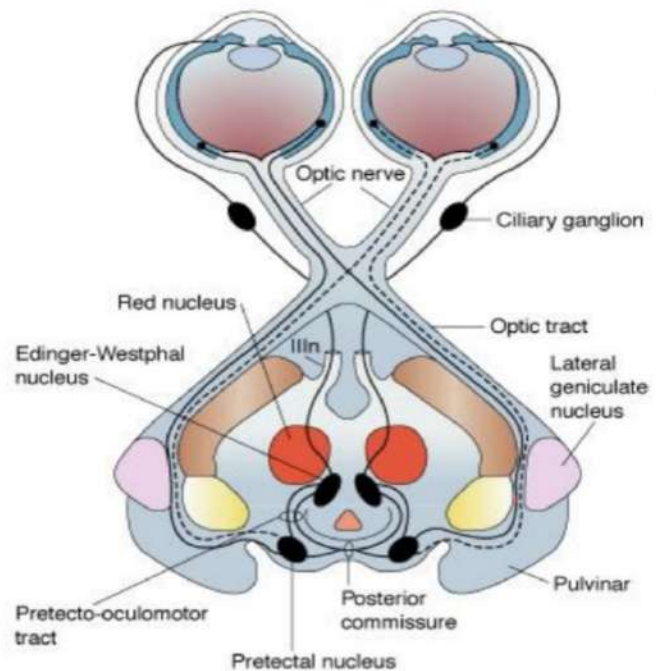
Receptors: Rods & Cones.

Afferent: optic nerve, crossing of nasal fibers in optic chiasma, optic tract, fibers leave optic tract in posterior $1/3$.

Center: **pretectal nuclei** of both sides which stimulates EWN.

Efferent: oculomotor nerve,
Parasympathetic division: to constrictor pupillae muscles (bilateral).

Response: Constriction of pupil of stimulated eye (direct) & unstimulated eye (consensual).



16/47

Causes of consensual light reflex:

3



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- 1) **Crossing of nasal fibers** (from the stimulated eye) in the **optic chiasma** to the **opposite side** → **light reflex** in the **opposite side**.
- 2) The stimulated **pretectal area** → **bilateral activation** Of **EWN**.

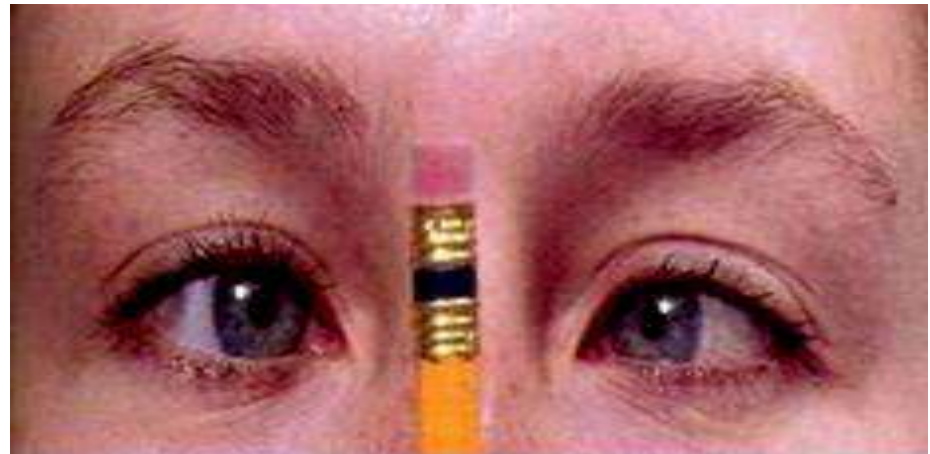
Near response

The changes that occur in the eyes
(optical system) to be adjusted
to see near objects clear.

على سبيل المثال لو هتقرأ كتاب

Components: Bilateral:

- 1) Accommodation.
- 2) Medial convergence.
- 3) Miosis.



Nervous pathway of near response

Stimulus: **blurred image of a near object.**

Receptors: **Rods & Cones.**

Afferent: **optic nerve**, crossing of nasal fibers in optic chiasma, optic tract, LGB of thalamus, optic radiations, visual cortex 17, 18 & 19, area 8.

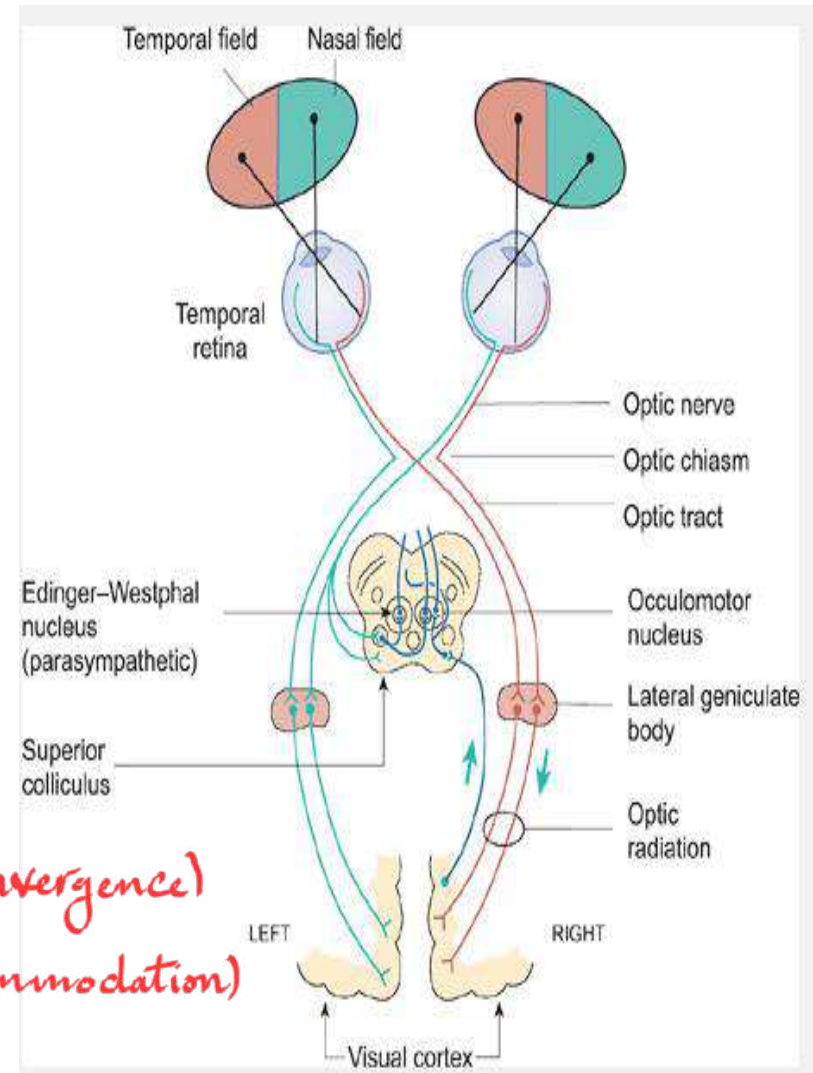
*(Visual pathway)
→ in the midbrain*

Center: **Sup. Colliculus** which stimulates oculomotor nucleus.

Efferent: **oculomotor nerve:**

- Somatic division: to medial recti. *(Convergence)*

- Parasympathetic division: to constrictor pupillae & ciliary muscles. *(accommodation)*



Near Response

Procedure

- Hold a pen in front of both eyes of the patient at arm length and focus on the pen.
- Watch the size of the pupil.
- Slowly move the pen closer to the eye while the patient continues to focus on it.
- Note the closest distance at which he can focus on the pen with his eyes.



Near response

(Accommodation reflex)

*↳ in the anterior surface of the lens
→ not post*

I- Convergence

Optic nerve (afferent limb) → optic
tract → visual cortex → frontal eye
field → corticonuclear fibres
(pyramidal tract) → oculomotor
nerve → contraction of medial recti
of both eyes.

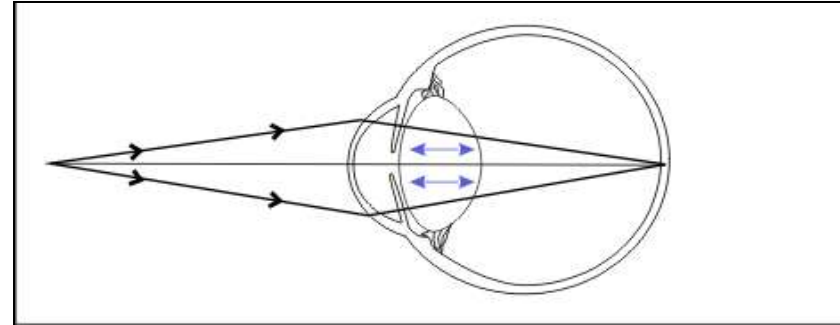


To allow the object to lie on corresponding
points on the retinae.

X double

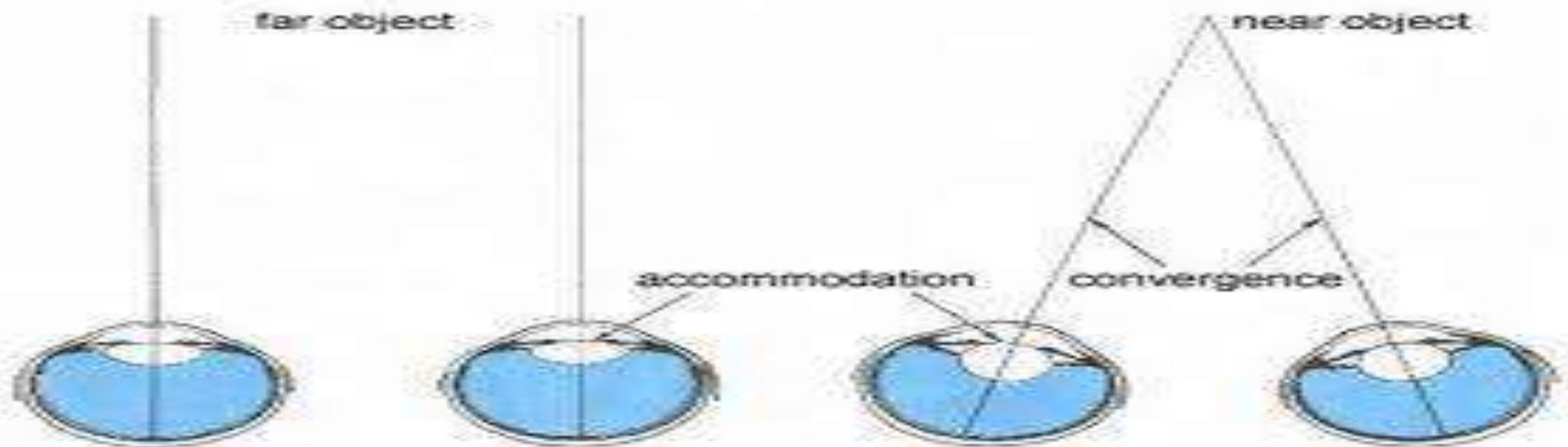
II- Increased convexity of the lens (accommodation):

Ciliary muscle contracts,
suspensory ligaments relaxed →
making lens more convex →



shortening its focal length.

To make the image falls on the retina.



III- Pupilloconstriction (Miosis)

Pupil constricts to prevent diverging light rays from hitting the periphery of the lens.

To prevent chromatic and spherical aberrations.



QUESTIONS

Q.1 Mention the Components of near response?

Q.2 What is Argyll- Robertson pupil?

- ①
- Components: Bilateral:
 - 1) Accommodation.
 - 2) Medial convergence.
 - 3) Miosis.

②

* Argyll Robertson pupil → Pupil
does not react to light, but will
react to near vision (accommodation)
Caused by: Lesion in pretectal
area



Visual Acuity

→ Represent the sharpness or clarity of vision

is the capacity to detect, resolve or recognize the **details of objects**.

The requirements for visual activity are:

2 Cones stimulated
 1 Cone resting between them

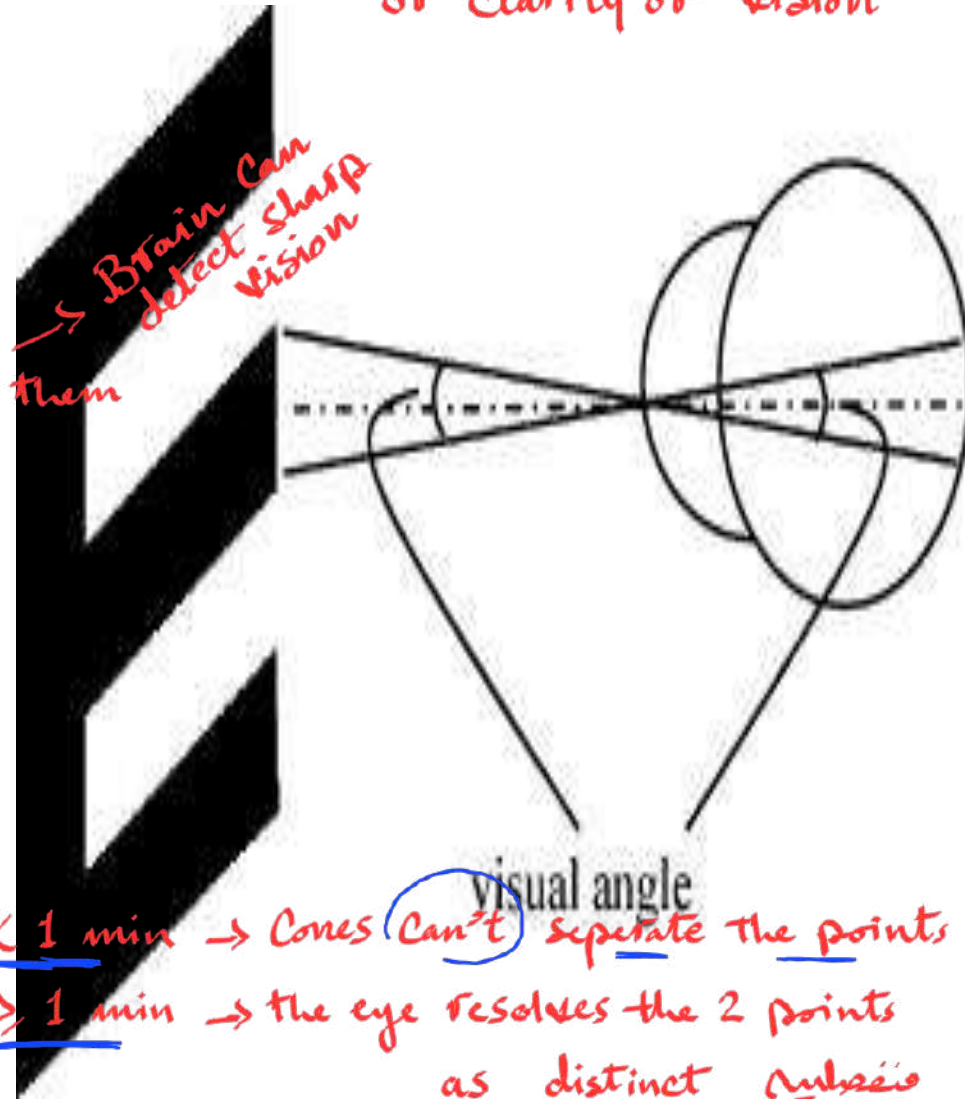
- **Light rays must fall on two cones with at least**

one unstimulated cone in between.

- **Visual angle at nodal point equals at least one**

minute 1/60

if the angle $< 1 \text{ min}$ → Cones Can't separate the points
 $\geq 1 \text{ min}$ → the eye resolves the 2 points as distinct images



Visual Acuity

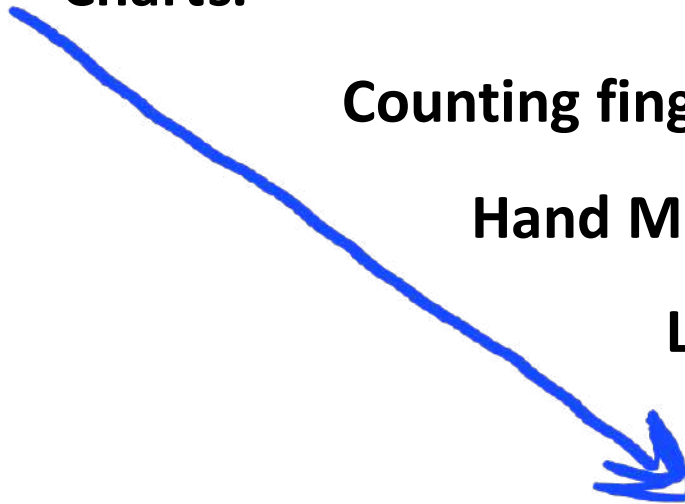
Visual acuity is tested by:

Charts.

Counting fingers.

Hand Movement.

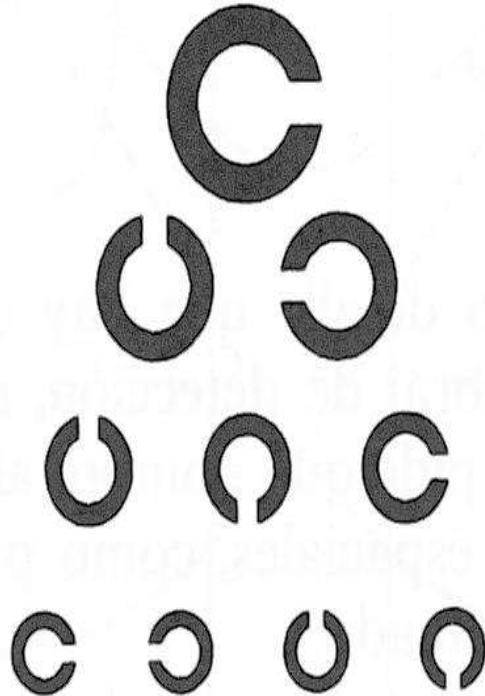
Light perception.



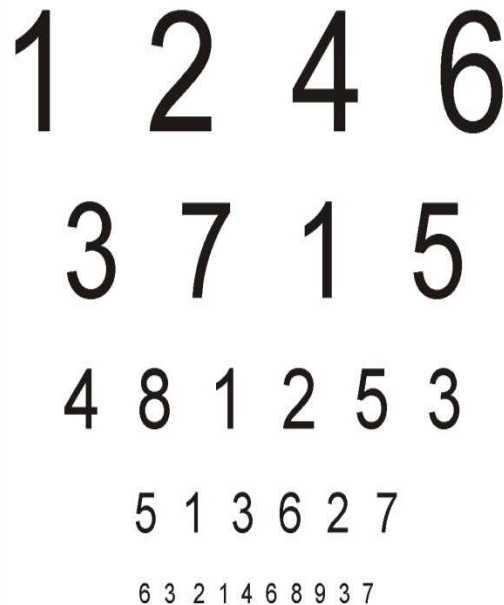
Standard distance
is 6 meters

Visual Acuity

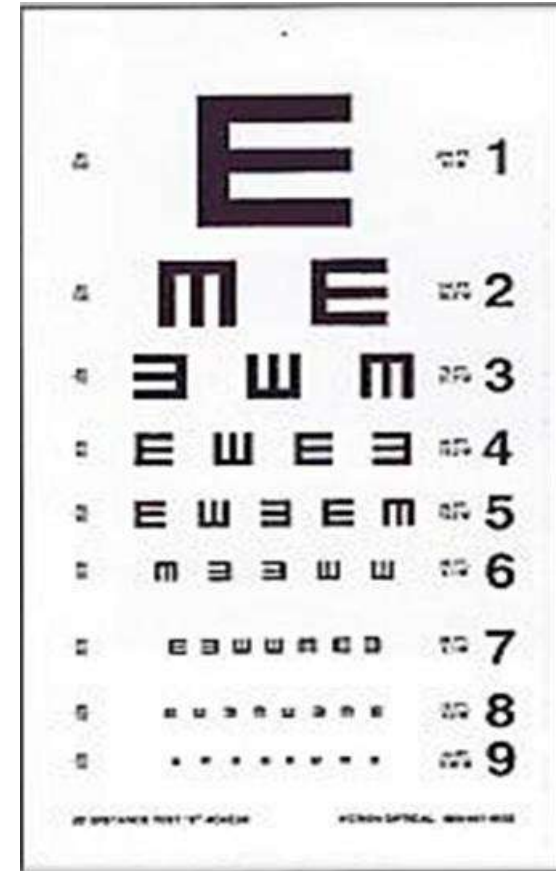
Landolt Chart



Number Chart



Snellen's chart



Visual Acuity

Paediatric snellen chart



Visual Acuity

$$V = d / D$$

V = Visual acuity.

d = distance of from the chart (Distance at which test is made (6 meters)).

D = distance at which the eye should be capable to read it clearly.

e.g.: 6/12 means that the patient's vision 6 m. from an object is equivalent to that of normal person see the same object from 12 m.

QUESTIONS

Q.1 Define visual acuity? *Capacity to recognize details of objects.*

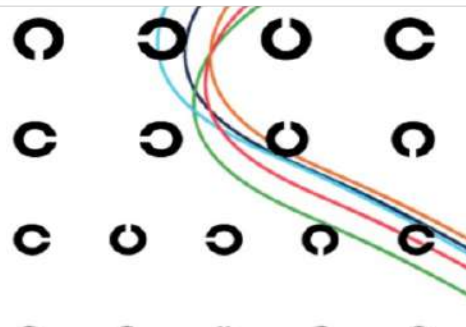
Q.2 Mention the names of the used charts? *Landolt ch., Number —, Snellen's.*

Q.3 What are the factors affecting visual acuity?



Factors affecting visual acuity:

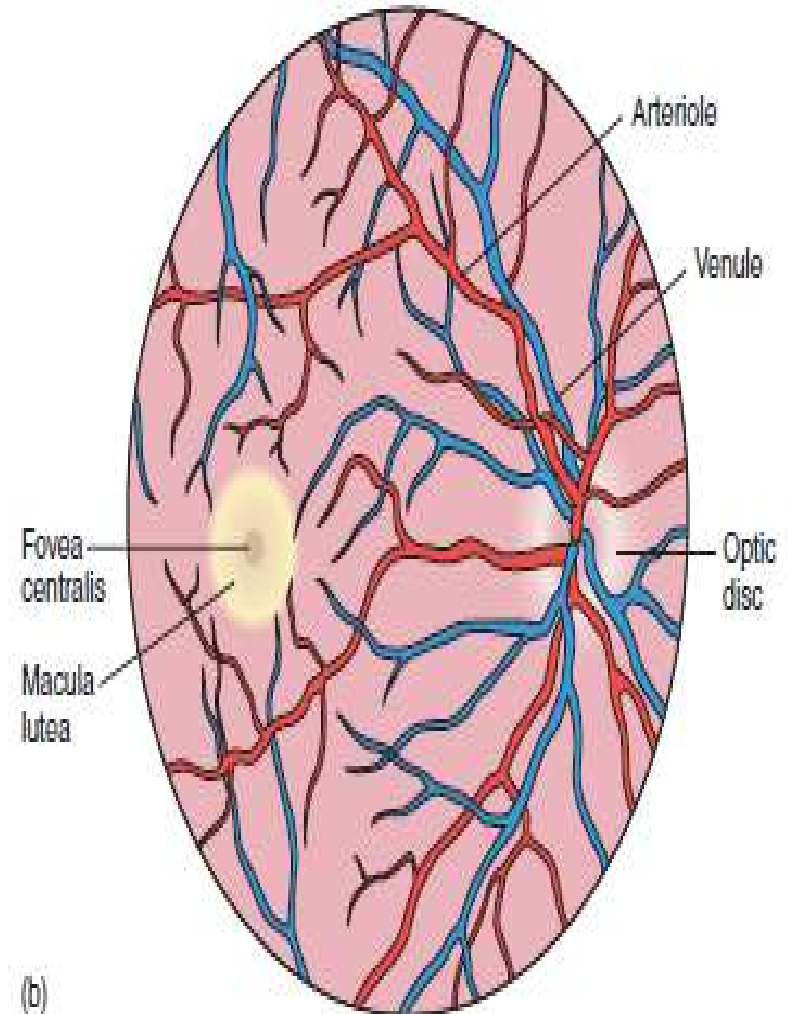
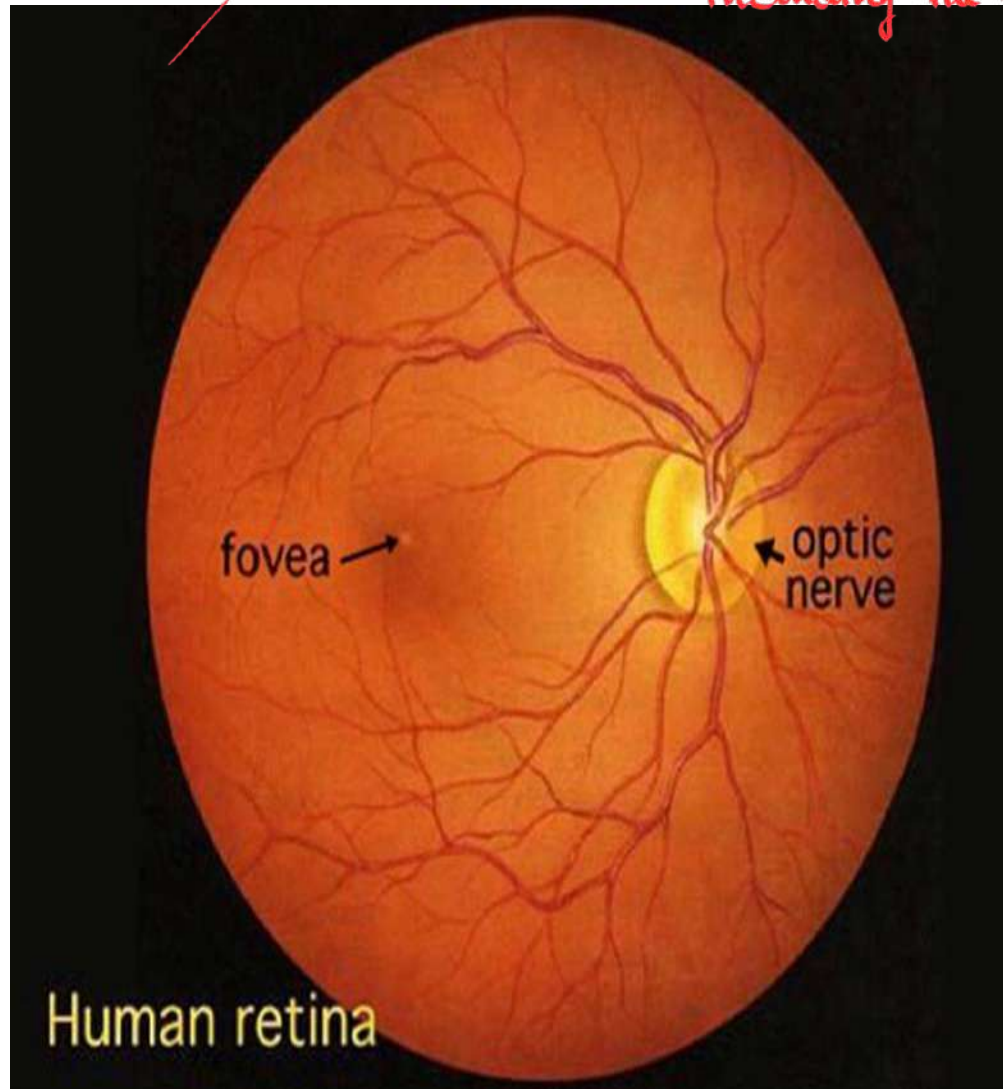
- 1-Degree of illumination and contrast
- 2-Errors of refraction and various diseases of the eyes as cataract, glaucoma & retinal detachment
- 3-Maximal at fovea centralis



دروس
كيفية

Fundus Examination

Routine eye test that allows a doctor to view the back of the eye including the retina, optic nerve, and blood vessels.



By Direct Ophthalmoscope

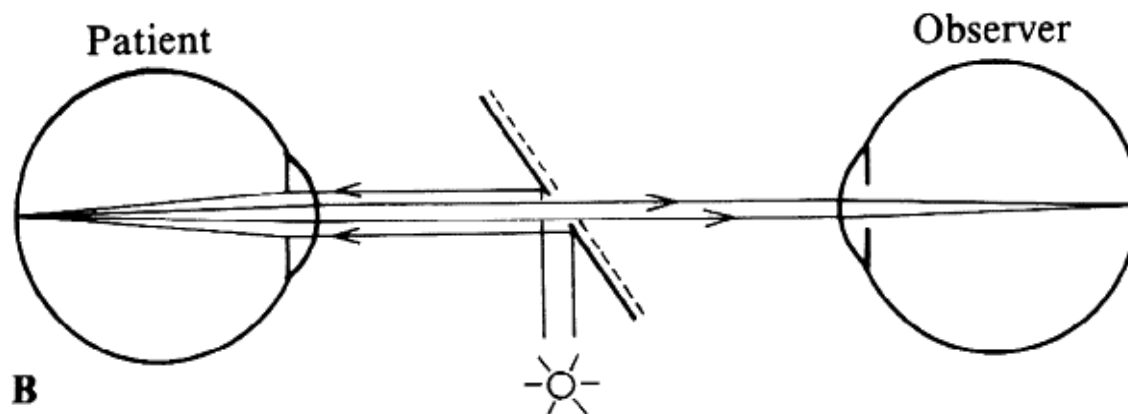
- The instrument **used for examination of the internal structures of the eye particularly the retina.**

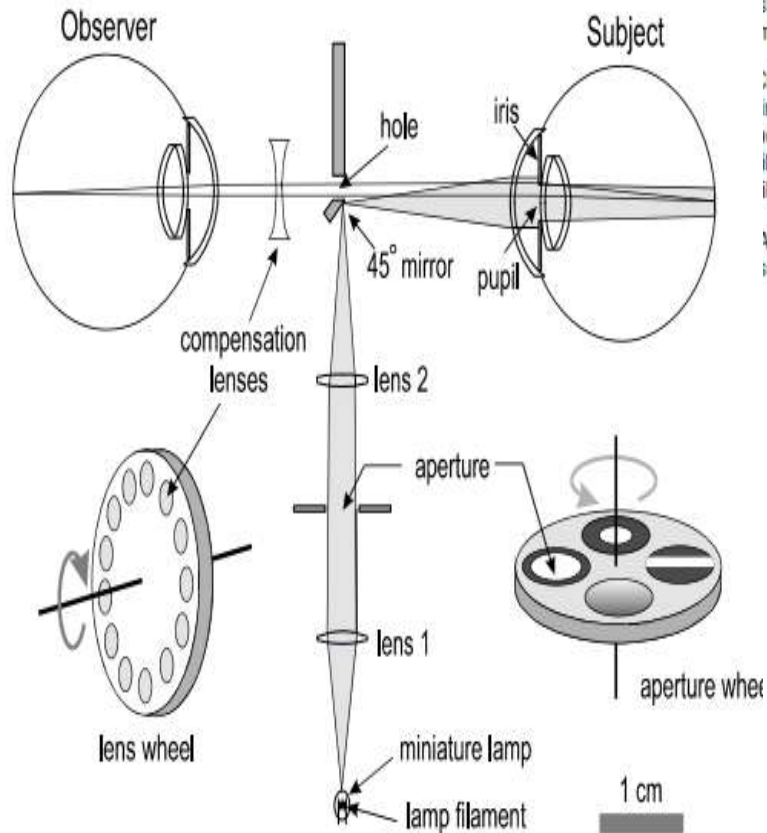


Principle of Direct Ophthalmoscope

A part of a light beam from the batteries is reflected at 90° using a mirror placed in the head portion of the ophthalmoscope at 45° angle.

The reflected rays from the patient's eye will be perceived by the examiner as he looks through a hole in the mirror that is through the light.





Detailed structure of the direct ophthalmoscope showing the illumination and viewing optical systems.

Fundus Examination

- Examination is **done in dark room**.
- Pupils should be **dilated by 2% homatropine**.
- Adjust the ophthalmoscope:
 - **The light not too bright.**
 - **The aperture to a plain white circle.**
 - **The diopter dial to zero.**

→ the shape of the light beam

→ focus adjustment for the patient's eye until the retina is sharp

→ emmetropic (normal)

Myopia → dial minus ⊖

Hyperopia → dial plus ⊕

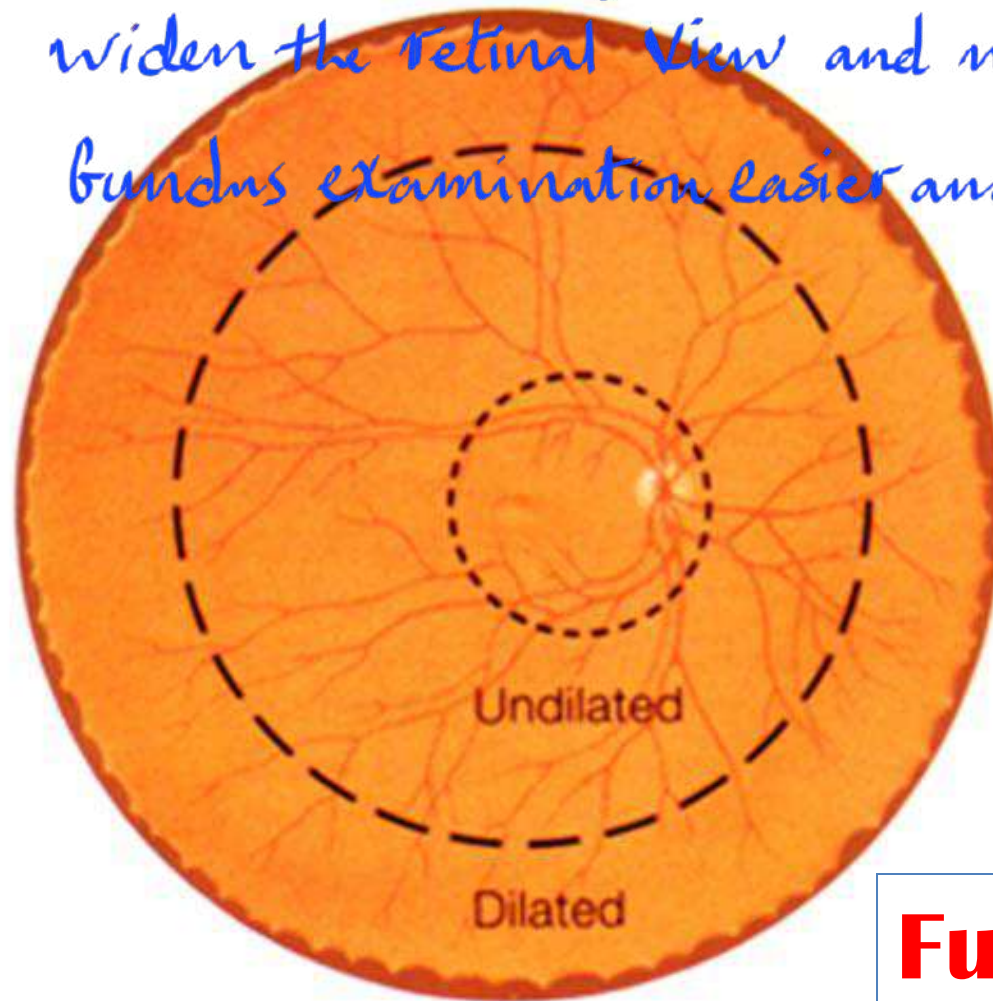


Why do we dilate pupils?

to allow more light into the eye

widen the retinal view and make

fundus examination easier and accurate

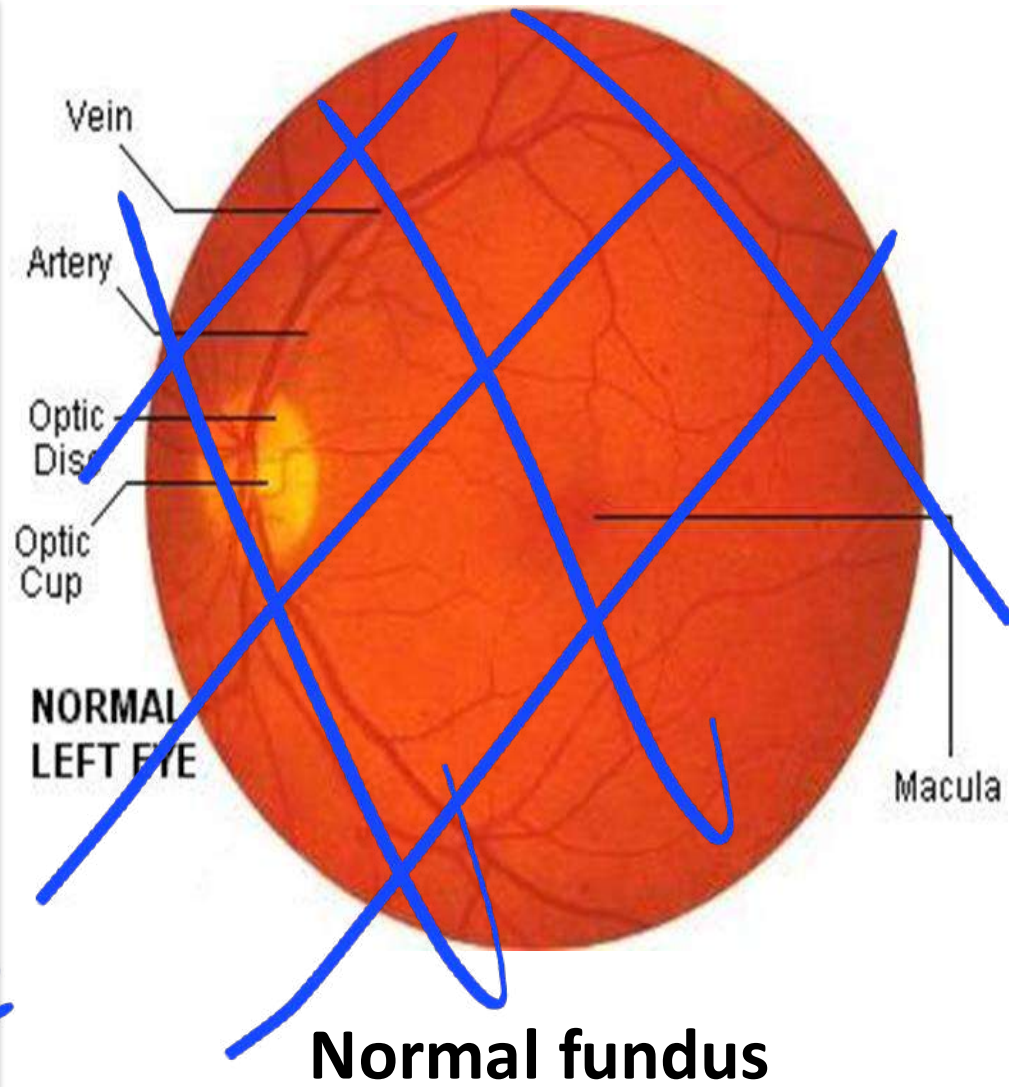
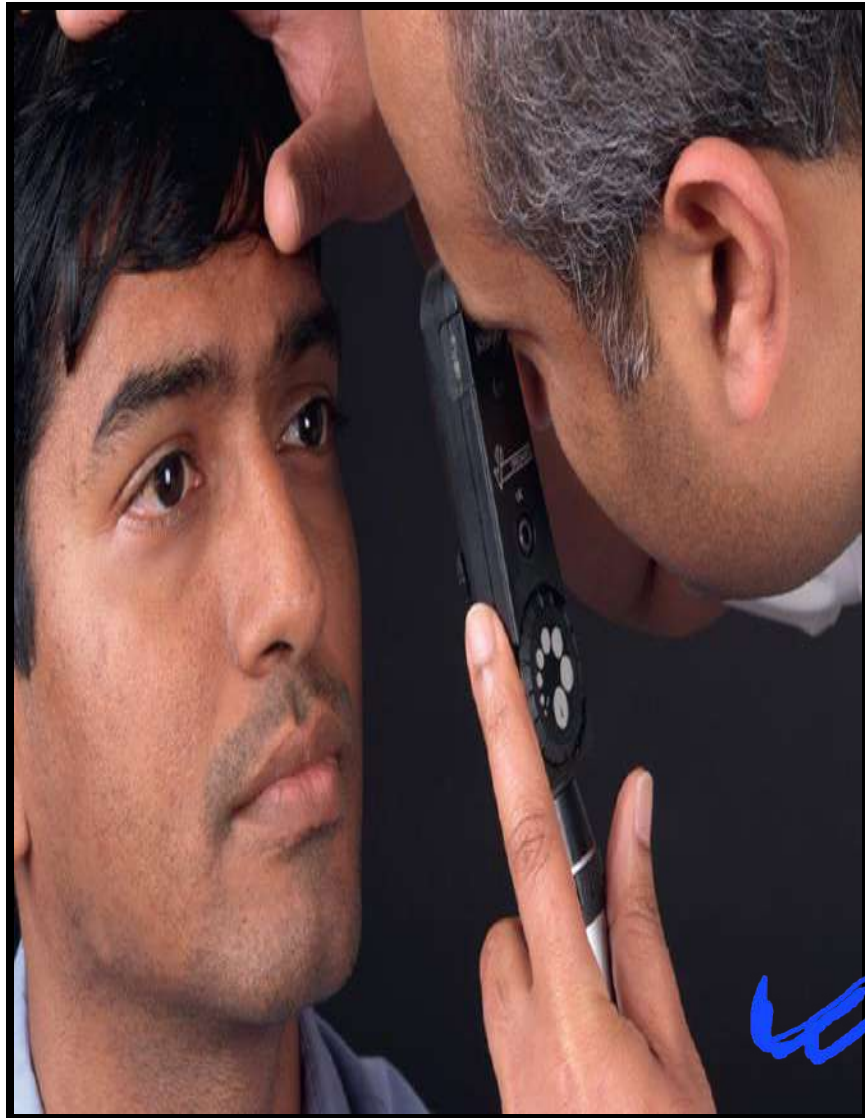


Fundus

Procedure

- Instruct the patient to look at a distant target.
- While examining the right eye, hold the ophthalmoscope with your right hand and examine with your right eye from right side of the patient.
- Start the examination from a distance of 35 cm then go closer following the red reflex.
- Adjust the diopter dial to bring the retina into focus.





Direct Ophthalmoscope

Advantage

→ Easy to carry anywhere
Portable

Easy to use

→ detailed view of optic disc and macula
Magnification ~ 15x

Can use w/o dilation
without

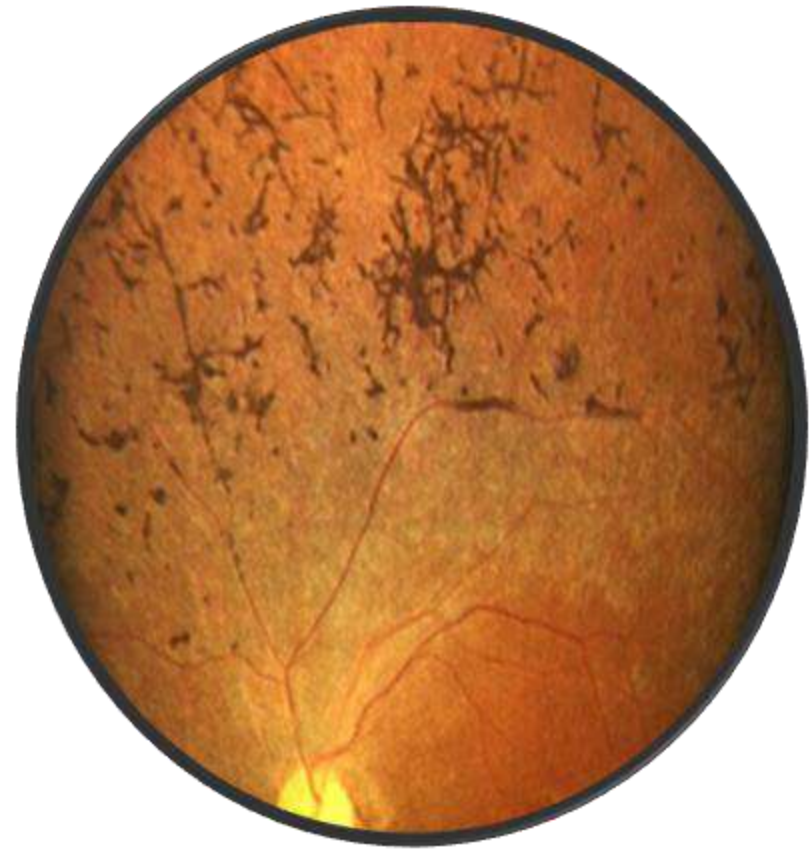
Disadvantage

→ Can not see peripheral retina
Small field of view

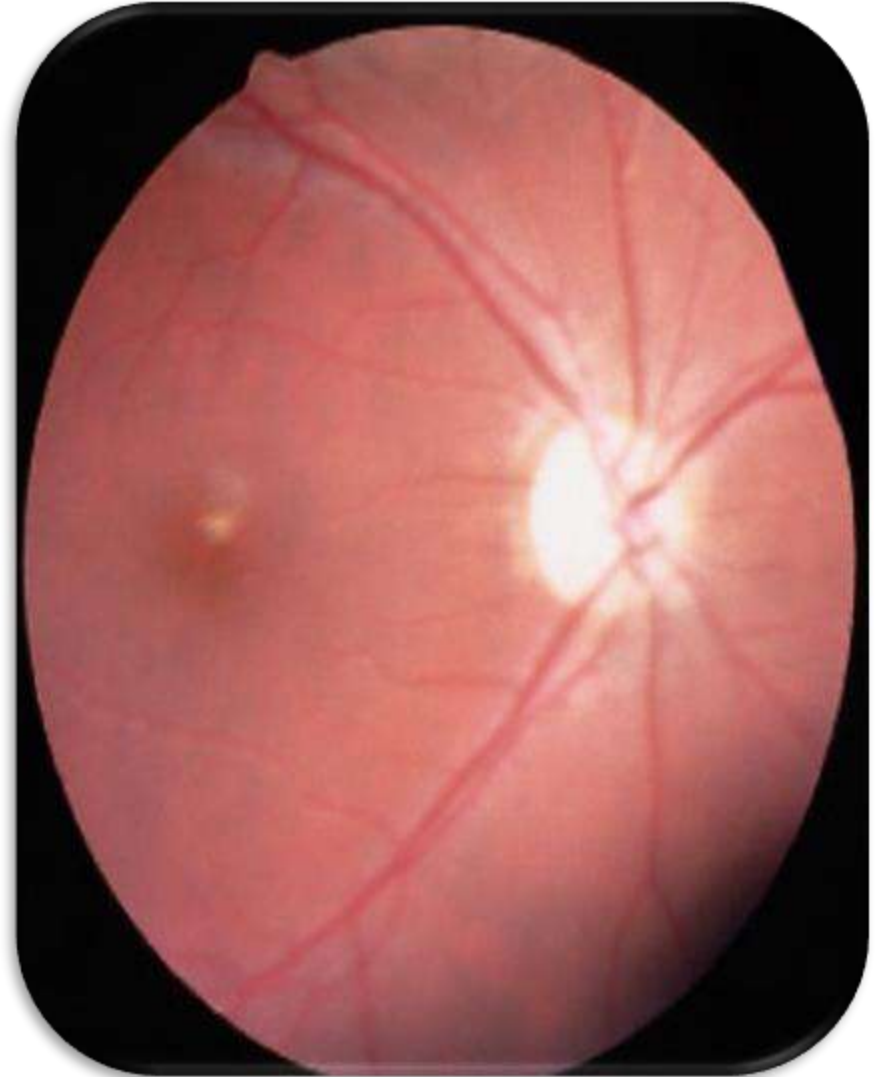
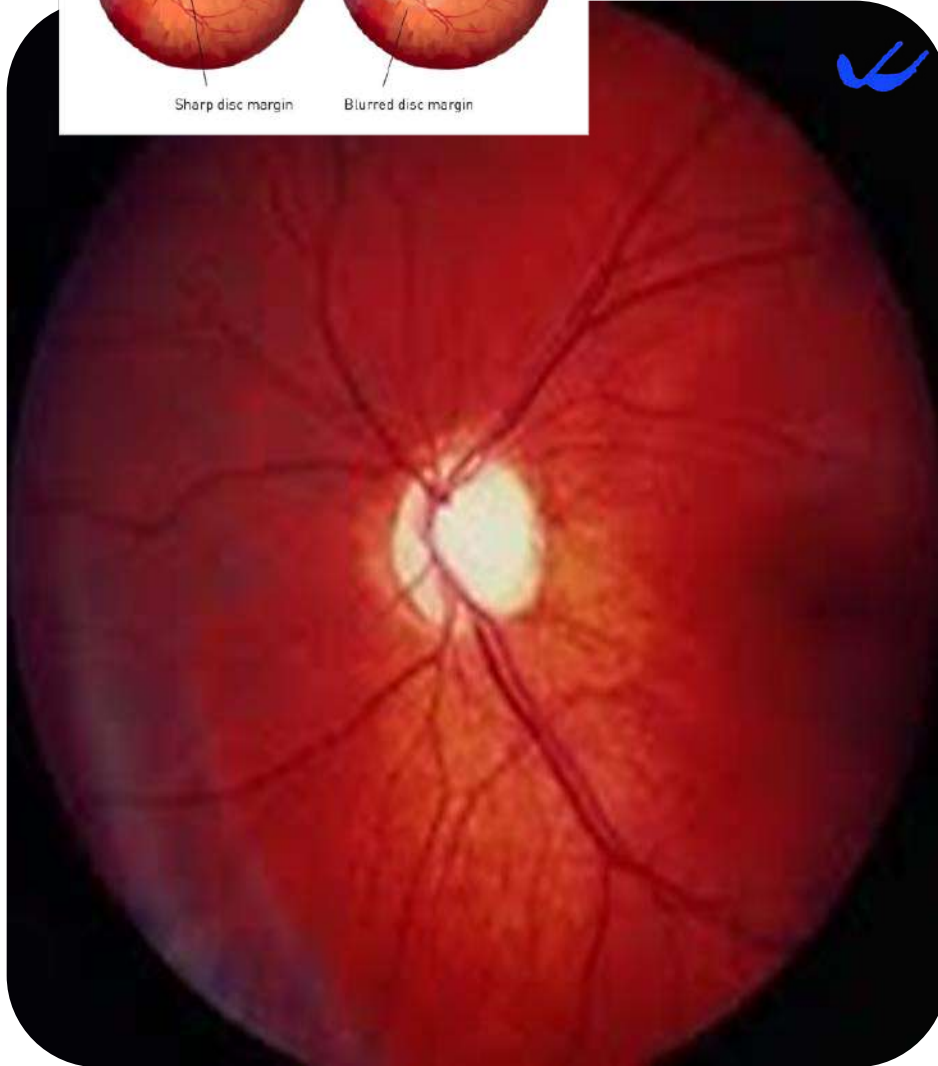
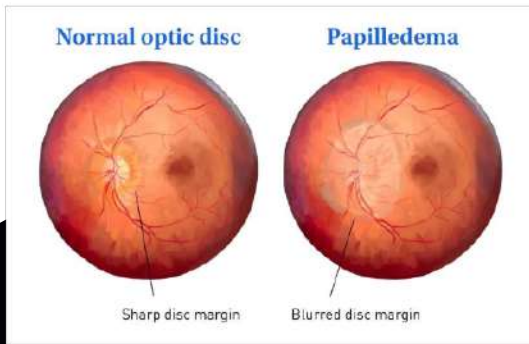
Any opacity in cornea or lens can degrade image
↳ image quality affected

Abnormal fundus

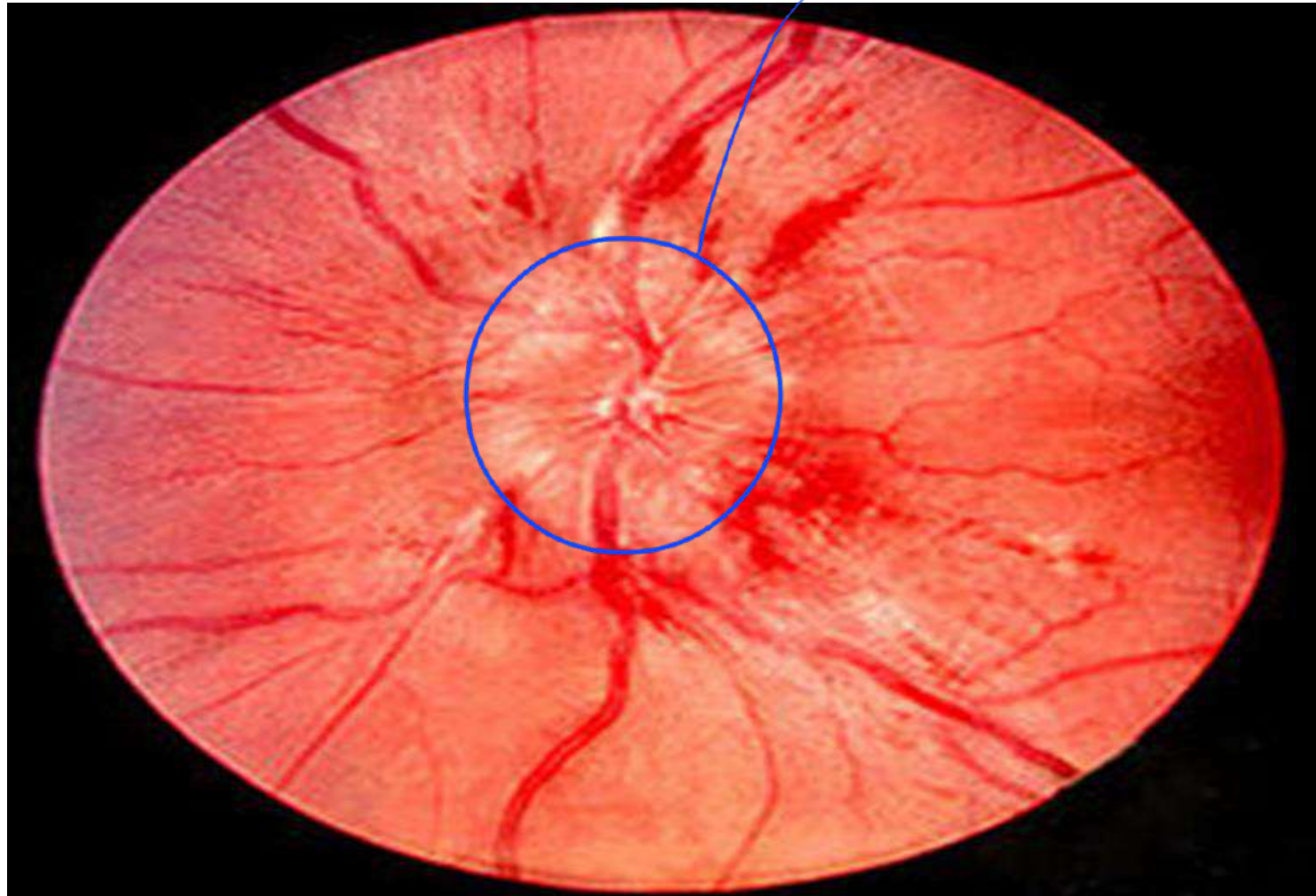
Retinitis Pigmentosa



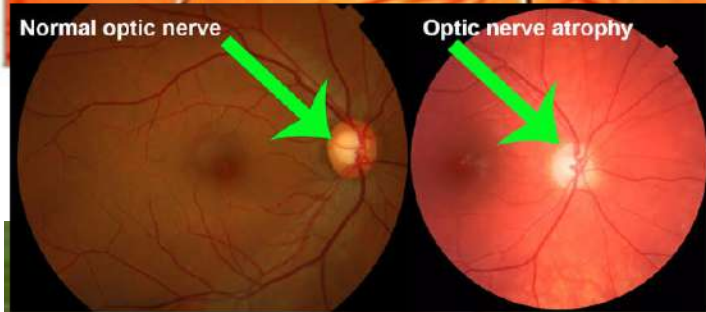
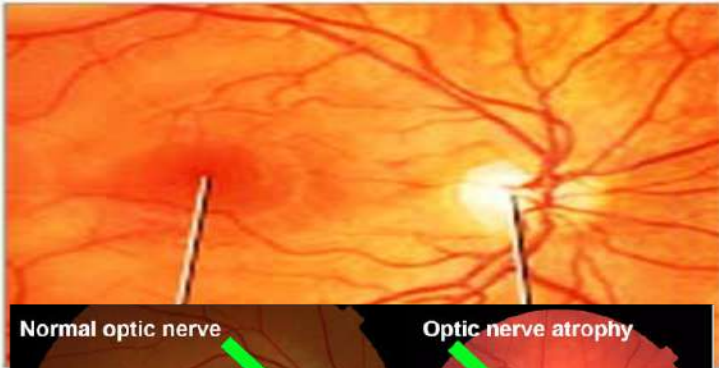
Optic atrophy



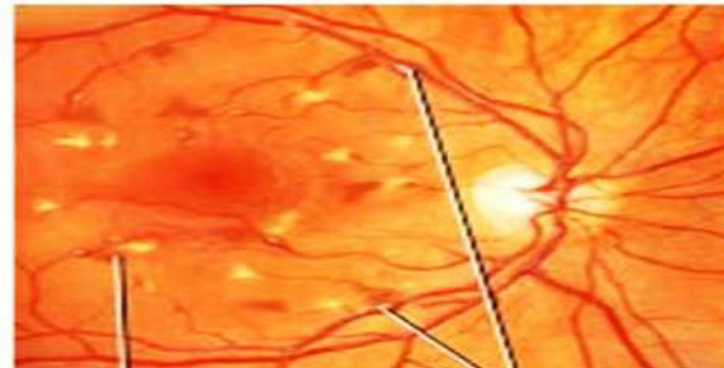
Papilledema



Normal retina



Retinopathy



Hemorrhage Aneurysms



Normal vision



Vision with
diabetic retinopathy

QUESTIONS

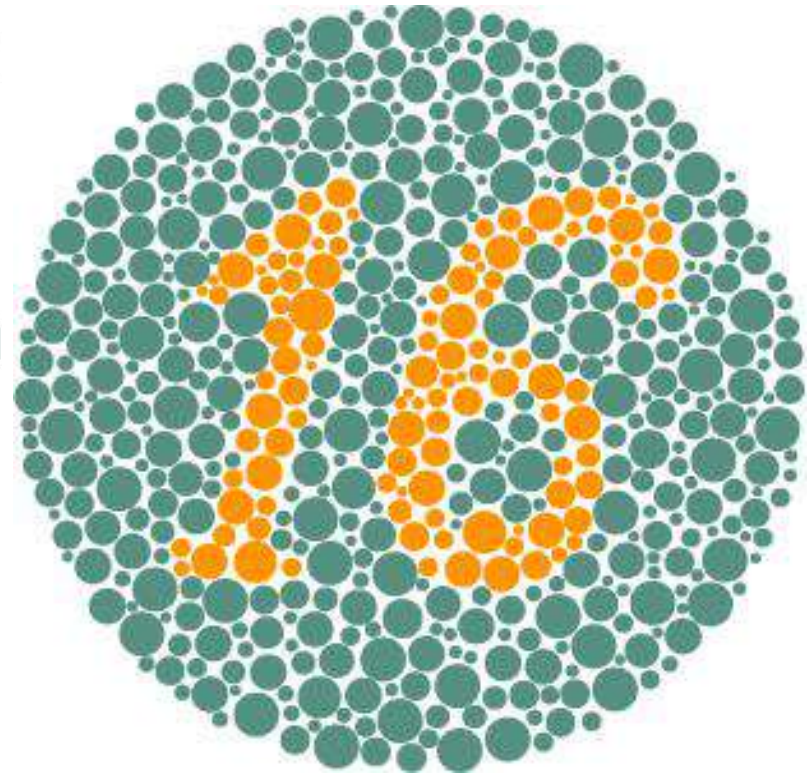
Q.1 Mention the uses of ophthalmoscope?

- The instrument used for examination of the internal structures of the eye particularly the retina.

Color vision

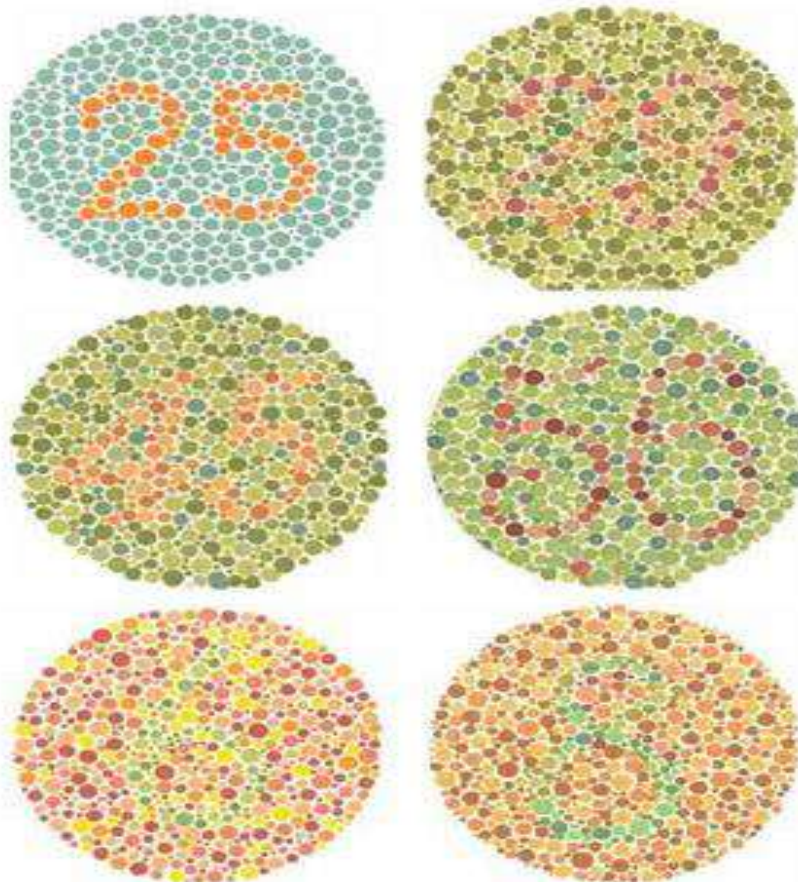
Is the ability of the eye to discriminate between colors excited by light of different wave lengths.

Colour vision is a function of cone.

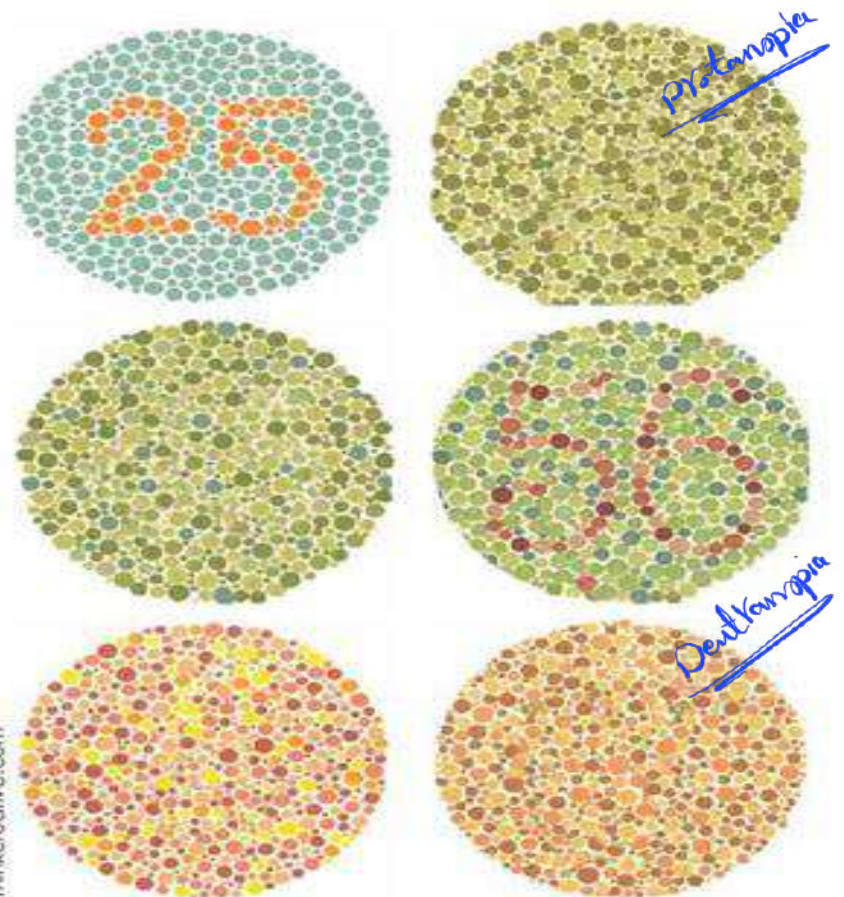


Ishihara Test For Color Blindness (X-linked recessive)

What People With Regular Vision See



What Red-Green Color Blind People See



QUESTIONS

Q.1 Mention the mechanism of color vision?

Q.2 Mention the causes of inability to read the figure correctly?

Q.3 Name some other tests of color vision?

→ Ishihara test
→ Anomaloscope
→ Cambridge Colour test

Q.4 Explain the practical importance of color vision? → safety / daily life / — .

1) Trichromatic theory

3 types of cones corresponding to the 3 primary colors (red, green and blue).

Color sensation perceived by the visual cortex depends upon the relative frequency of impulses in each of these 3 cones.

Equal stimulation of the 3 cones = white color.

Unequal stimulation of the 3 cones = color sensation.

Color perception is a retinal phenomenon.

Color translation is a cortical phenomenon.



Color blindness

It is inability to discriminate colors .

Causes of color blindness :

- 1-Genetic:** It is X-linked recessive.
 - present in 8% of males and 0.4% in females.
 - The disease is transmitted from female to their male children.
- 2-Acquired:** 2ry to eye diseases
e.g glaucoma, optic neuritis, diabetic retinopathy and retinal detachment.
 - Occurs in one or both eyes.



Causes of color blindness:

(1) Anomalous Trichromates (6%) :

The person has the 3 cone systems but one of them is weak → patient can recognize deep color (not the pale color).

- a-Protanomaly = red color weakness.
- b-Deutanomaly = green color weakness.
- c-Tritanomaly = blue color weakness.

(2) Dichromatic vision (1%):

The person has 2 types of cones intact and one cone is defective → patient can not recognize certain color.

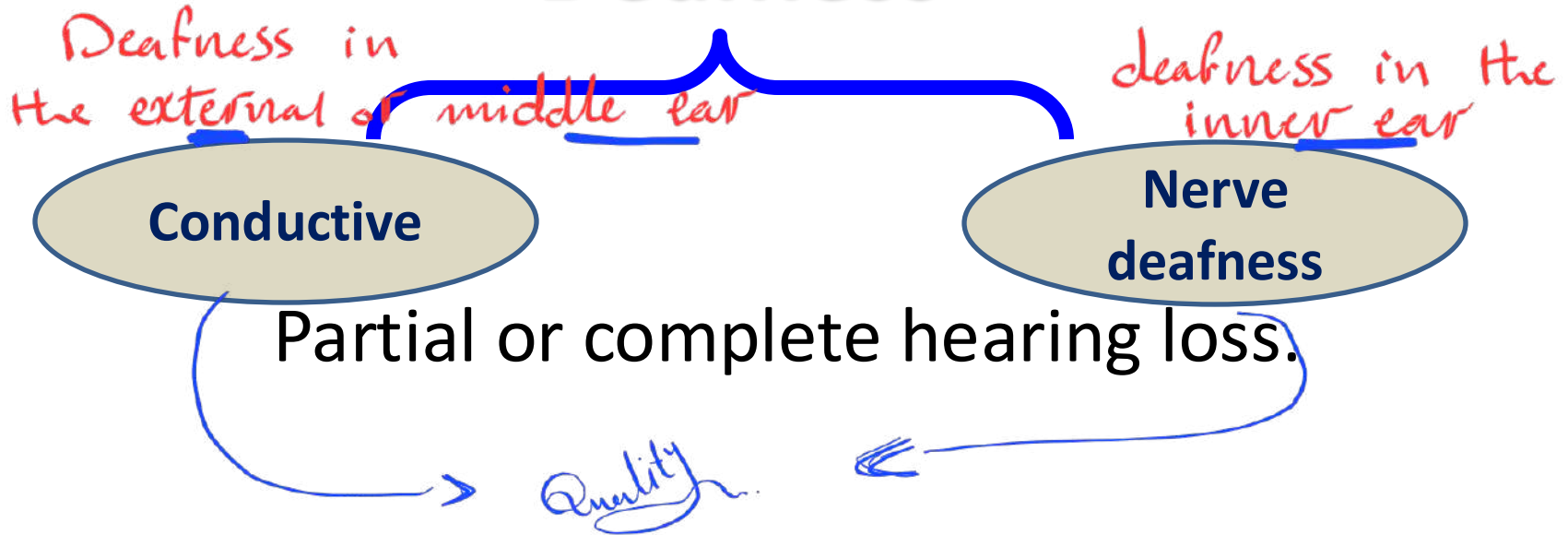
- a-Protanopia : i.e red blindness.
- b-Deutanopia: i.e green blindness.
- c-Tritanopia: i.e blue blindness.

(3) Monochromatic vision (1%):

The person has only one intact type of cones.
He matches colors by varying the intensity of one primary color.



Deafness

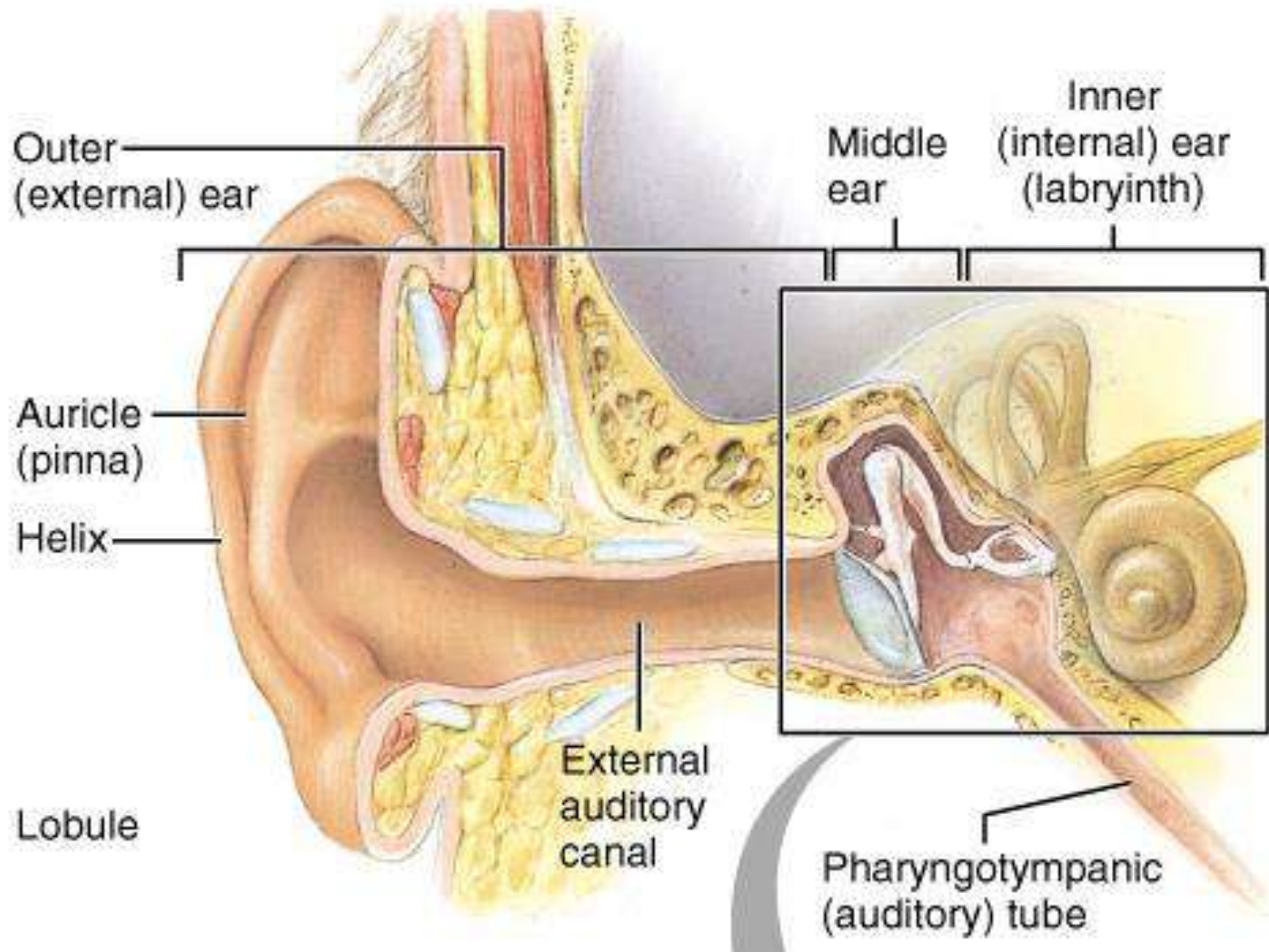


Sound is conducted to ear by 2 ways;

Air conduction {**Ossicular** route}: efficient

Bone conduction less efficient

Air conduction **better**



Deafness

Definition: partial or complete loss of hearing.

Types:

(A) Conductive deafness: diseases in external or middle ear.

1-External ear:

- a-**Congenital** atresia
- b-**Wax accumulation**
- c-**Foreign bodies**
- d-**Inflammation:** Otitis Externa
- e-**Tumors:** Exostosis & cancer

2-Middle ear:

- a-**Drum:** **perforation** and adhesion.
- b-**Trauma** to tympanic cavity.
- c-**Inflammation:** otitis Media.
- d-**Tumors.**

Deafness

(A) Conductive deafness: diseases in external or middle ear.

3-Ossicles:

- a-Congenital absence.
- b-Traumatic dislocation.
- c-Inflammation.
- d-Otosclerosis.

4-Eustachian tube:

- a-Inflammation & edema.
- b-Allergy.
- c-Mechanical: obstruction by adenoids or nasopharyngeal tumor.

(B) Nerve (receptive) deafness:

diseases in the inner ear, cochlear nerve or brain.

1-Cochlear lesions:

- a- Congenital:** German measles affecting the mother during the 1st 3 months of pregnancy and intake of ototoxic drugs.
- b- Natal:** Birth injury or anoxia.
- c- Trauma:** head injuries that damage cochlear nerve.
- d- Infections:** Measles, mumps, typhoid, chronic otitis media that damage the basilar membrane or organ of Corti
- e- Mennier's syndrome:**  endolymph pressure inside Scala media.

(B) Nerve (receptive) deafness:

2-Brain lesions:

Lesion in auditory pathway especially if bilateral lesions.

a-Vascular: Vertebro-basilar insufficiency .

b-Brain tumors.

c-Severe head injuries.

d-Multiple sclerosis.

e-Epilepsy.

Examine for hearing

❖ Watch test



Ask your patient to close one ear with his finger
Slowly bring a watch with a loud click near the other ear

Notice the distance at which the ticking of the watch is
first heard

Compare this with the other ear

2- Rinne 's test

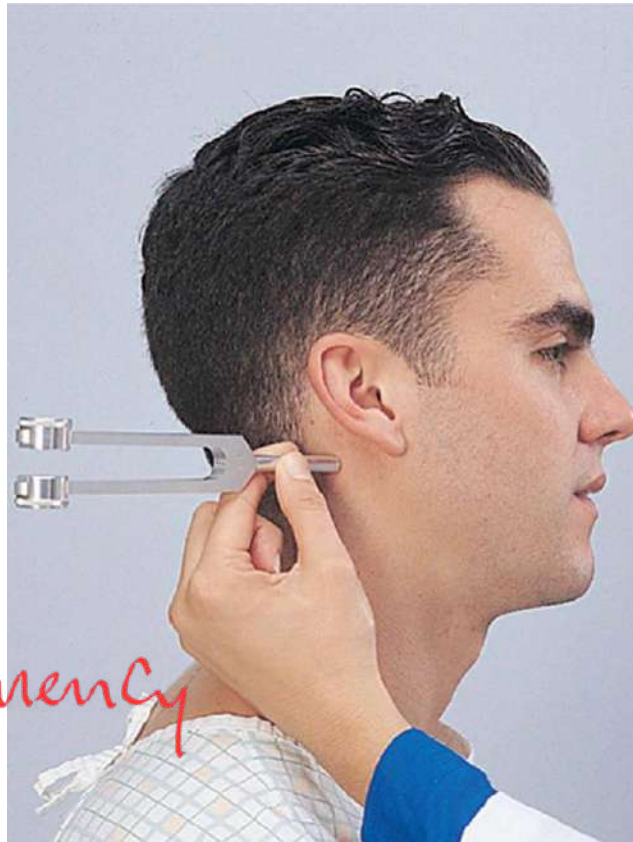
→ Qualitative

Rinne positive	Air conduction better	normal
Rinne negative	Bone conduction better	Conductive deafness
Reduced rinne positive	<u>Air better</u> , but reduced	Nerve deafness

↳ Can hear for short time

less ability
of hearing
↓
low frequency

tuning fork
with short
arm
↓
give high frequency



3- Weber test → Detect unilateral hearing loss

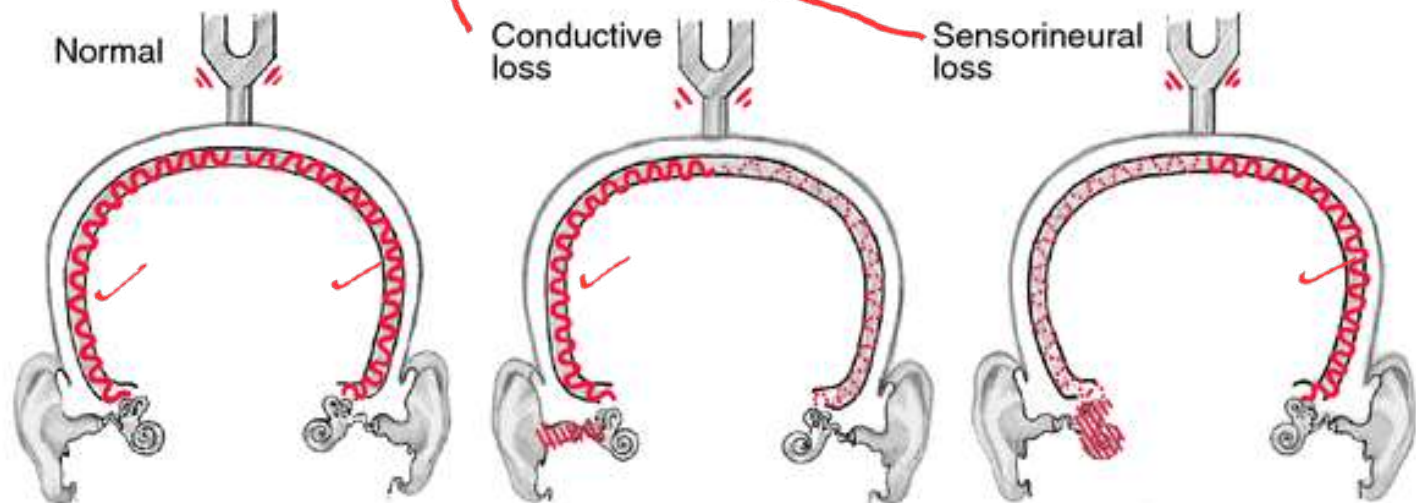
Sound louder in right ear:

Better hearing in the diseased ear

- **Right conductive deafness** (masking effect on noise)

- **Left nerve deafness**

Conductive deafness → Sound louder in affected ear
nerve deafness → Sound louder in normal ear



Tuning Fork tests

1-Weber test:

The base of vibrating tuning fork is placed **on** the **center of forehead**.

a- Normally: sound is equally heard in both ears .

b- In **C.D.**: **sound is better heard in the diseased ear** (not masked by noise from external world)

c- In **N.D.**: **sound is better heard in normal ear**.

2-Rinne test:

The vibrating tuning fork is placed **on** the **mastoid** process until the subject no longer hears it, **then** the fork is held in **air near the auricle**:

a- Normally: **hears sound after bone conduction is over**

b- In C.D.: **he does not hear sound after bone conduction**.

<i>Hearing</i>	<i>Weber's</i>	<i>Rinne's</i>
^ Normal	Same in both ears	AC > BC
CD CAB	<i>louder in the affected ear</i>	BC > AC
SD SNA	<i>louder in the normal ear</i>	2AX AC > BC <i>(Both below normal)</i>

AC = Air Conduction

CD = Conduction Deafness

BC = Bone Conduction

SD = Sensory Deafness

4- Audiometry



Audiometer

-An electric generator of pure tones from 125 - 12.000 Hz.

-Records the threshold of hearing for air & bone conduction on a graph .
مخرجة عازلة للصوت

-Performed in sound proof room.

-Connected to the subject with ear phone .

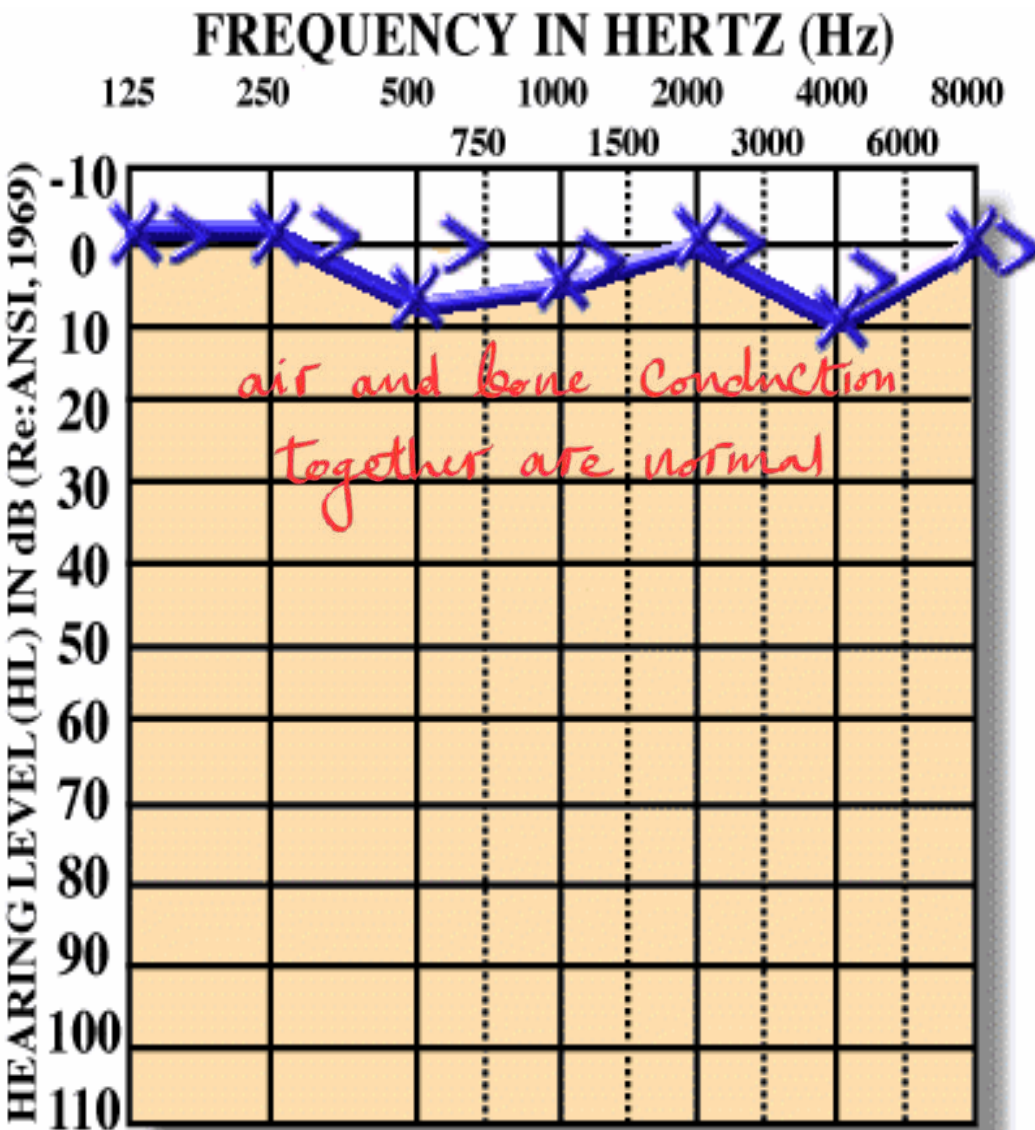
The subject is tested for the 2 physical parameter of sounds :

1-Frequency: the range is usually 125 - 8000 Hz .

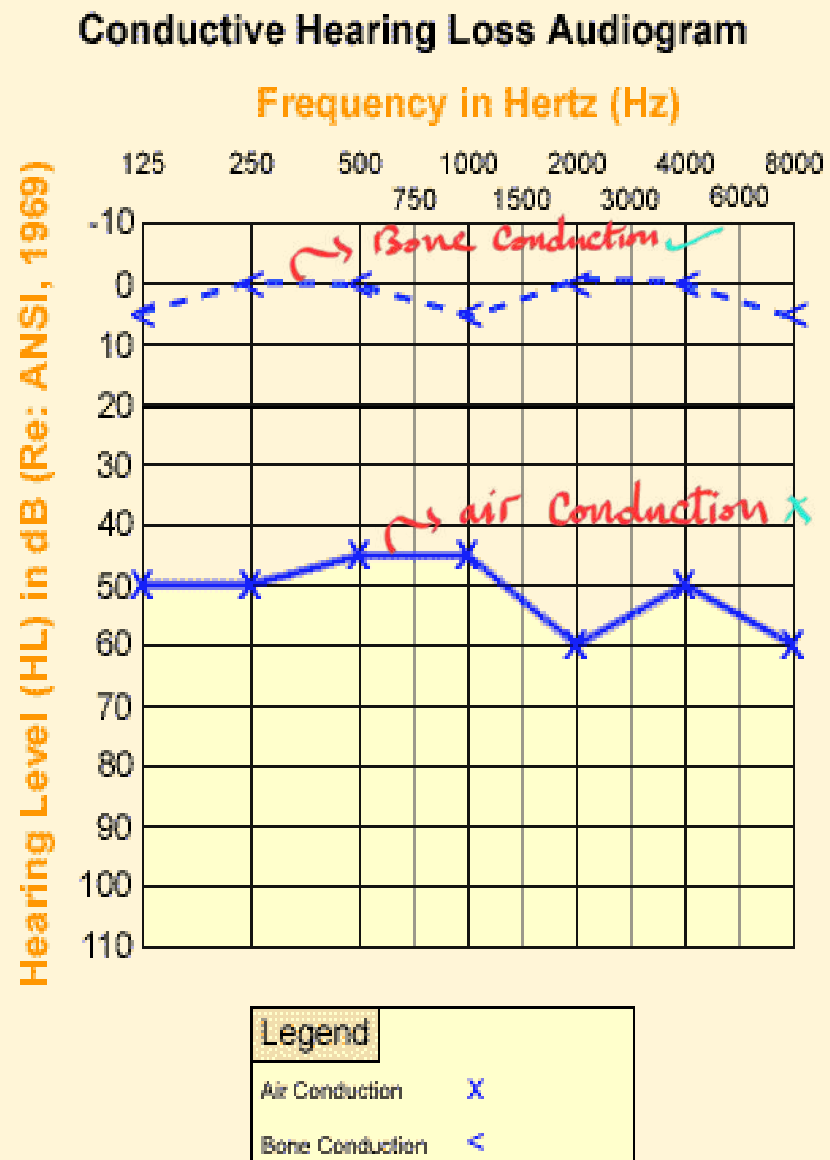
2-Intensity: the threshold intensity for each frequency is recorded.

a-In conductive deafness: impairment of air conduction with normal bone conduction.

b-In nerve deafness: impairment of hearing for both.



Normal Hearing



THANK YOU